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S·A·E Journal

SEPTEMBER 1945

Silver Bearings —E. B. Etchells and A. F. Underwood

Symposium Reveals What Motoring Public Craves
—Bert Pierce, Herbert D. Wilson, Gordon Hebert and John D. Burke

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Piston Rings in the War —D. M. Smith

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Contributions of Industry to Ordnance Tank-Automotive Engineering —Col. Joseph M. Colby

Synthetic Rubber Mechanical Parts in Present and Postwar Vehicles —Ellwood F. Riesing

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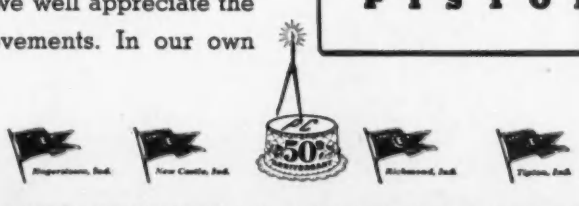

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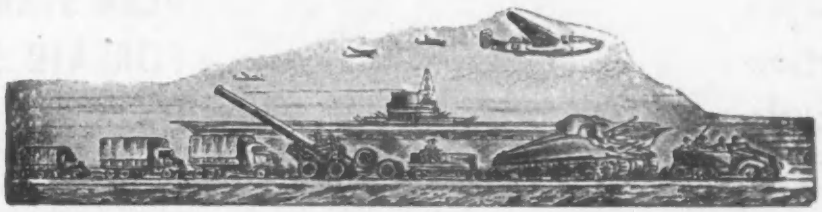

News of the **OCTOBER** *Issue*

By Norman G. Shidle

No Time to Read

LITERACY consists of being able to read and write. All of us are conference illiterates at one time or another. We fail to read agenda in advance, to refresh turgid thought-streams regarding problems to be argued – even to study background material provided by somebody else's forethought.

Otherwise literate executives go into conferences carrying unread memoranda which, if read in advance, would conserve man-hours and jettison misunderstandings. Conference-needed information, with which others in the group have familiarized themselves, remains unknown to the man "too busy to read." The conference halts near its start, while someone brings him up-to-date.

Even more difficult is the man who won't admit he has failed to read the advance analyses. He exudes non sequiturs, causing the conference to move in circles until some uneasy confrere does detail for his benefit what the others already know.

Most troublesome, perhaps, is the man who glances hastily through the advance memoranda, misses the more subtle implications, and jumps to conclusions on the basis of slightly confused knowledge. He makes the conference back up before it even can start going in circles. Semi-illiteracy is the mother of conclusion-jumping.

Concentrated and single-purposed reading can be the greatest of executive time savers. Most men who think they are too busy to read, in reality are too busy not to read.

"WEASEL," DESIGNED FOR SNOW, BESTS MUD, INVITES RESEARCH

PRODUCT of planned engineering parenthood is the "Weasel," the Army's all-purpose amphibian. This offspring of allied armies and industries is indeed a war baby, designed to military specifications.

Conception and birth were as secret as the testing of pilot models, which were flown to areas of snow-covered terrain. The little amphibian early demonstrated qualities unexpected even by the anxious parents, including such marvelous ability to romp through soft-going in mucky terrain that locomotion in snow, the original objective, was forgotten almost as soon as achieved.

War Moves On

World War II moved from the Aleutians to warmer climates and the Japanese ceased to menace Alaska before the "Weasel" could perform the specific tasks for which it was designed. Yet it proved to be so capable of negotiating mud as to endear it to the Army. Furthermore, it demonstrated such high mobility, regardless of terrain, as to endear it to engineers becoming increasingly convinced that this war baby is not only an able military amphibian, but the key to a storehouse of fundamental technical knowledge concerning mobility of track-laying vehicles, regardless of size.

Sudden Changes

Full report of the engineering midwifery of the "Weasel" will be presented in October *SAE Journal* by H. E. Churchill, of The Studebaker Corp. The article will be one of those accounts which starts with the idea and leads the reader through to final engineering accomplishment.

Birthpangs of the prototype "Weasel," Mr. Churchill will say, lasted just 38 days, or from scratch to an experimental model. Specifications called for an amphibian 196 in. long, 60 in. wide, 50½ in. high. It was to weigh 7,000 lb with full cargo load, exert a unit ground pressure of 2.25 lb per sq in., and possess a life expectancy of 1,000 miles, 95% in snow and 5% over hard ground. Requirements called additionally for track propulsion in snow, a tunnel stern, and a propeller for travel in water.

Initial tests and changing strategic requirements caused revisions in specifications during the design even of the first model. A second design concurrently was initiated, and several hundred of these "Weasels" were built for testing. Overall length was reduced to 128 in., the propeller was abandoned, loaded gross weight was reduced to 4600 lb, and other changes incorporated to meet new requirements.

These models scarcely had undergone field testing when a third, and jackpot, design was evolved. The length was only 4 in. short of that originally planned, track on ground was 78 in. instead of 89 in., and unit pressure was cut to below 2 lb per sq in.

Research Vehicle

Development of the "Weasel," Mr. Churchill will indicate, has produced a veritable library of engineering data relating to the ways of tracks with terrain, and the effects of various power and drive applications to mobility and operating efficiency. Number and distribution of bogies are vital factors, he will report, and both laboratory and field observation of the formation of waves under tracks have created new conceptions of flotation problems.

DEVISE WAYS OF CURBING SLUDGE

ENGINEERING razzledazzle, troublesome for years, has been the formation of varnish, or lacquer, and sludge in internal combustion engines. Most troublesome of all has been the finger-pointing problem of ascertaining whether the blame lay with engine, fuel, or lubricant.

Path to solution of this complex problem, particularly annoying in commercial motor vehicles engaged in war transportation, will be pointed in October *SAE Journal* by H. C. Mougey, of Research Laboratories Div., General Motors Corp. Mr. Mougey will report the results of investigations made by numerous individuals and groups, summarize and interpret findings, present an exhaustive bibliography.

While research work is continuing in the hope of finding the solutions for all problems involved, certain conclusions have been reached, such as:

- Chief cause of low temperature sludges is water; varnish is not serious.
- Chief cause of intermediate temperature sludges is fuel; varnish may be serious.
- Chief cause of high temperature sludges is oil; varnish can be serious.
- In commercial operation, the three tend to overlap; maintenance, operating conditions, and engine design are complicating factors.

Springs Damaged By Accumulation Of Subtle Evils

WHEN, if ever, the cumulative efforts of World War II are cataloged, or even estimated, the variety will be as astounding as the volume. Possibly never before has war reached so far into so many nooks and crannies of what *was* normal life.

For instance, as Robert N. Austen, of The Iron City Spring Co., will say in October *SAE Journal*, because of the war, what prewar were overloads for motor trucks became normal loads. Since Mr. Austen will be discussing maintenance engineering for chassis leaf springs, overloading will be cited as only one of the wartime factors affecting automotive equipment.

Prewar, evidently, spring troubles were corrected by effecting replacements. The war changed all that. Instead of getting new springs, engineers had to find out what was the trouble with the old ones, and correct it.

Springs, it appears, are heirs to almost as many ills as humans – "fallen arches," repeated breaks, loose bolts among them. Also, Mr. Austen will reveal, big spring troubles grow from little evils, many of them indirectly related to springs. In fact, he will say, spring troubles are much like tire troubles, only worse. The observant engineer can see tire troubles developing. Spring troubles reveal themselves too late.

Springs react unfavorably to neglect, he will report, and preventive maintenance is essential to their welfare. They seem to accumulate all the ills resulting from overloading, fast driving, inefficient braking.

"You will be surprised," Mr. Austen will assert, "at the dividends the spring will return for just a little attention."

■

CONTROLS MAKE FLYING EASIER

WHEN it comes to progress in terms of relieving human beings of concern and labor, accolades are due those many engineers who have made it possible for tiny people to operate gigantic aircraft. They have developed to a science the knack of multiplying human strength and ability so that the pilot may control aircraft tremendous in size and weight with a minimum of energy, maximum of speed and accuracy.

Progress has been made also in giving the pilot control over the engine, that it too may operate at maximum efficiency. This control has been extended even to combustion, which means that detonation can be held at that point where the engine produces every last ounce of power without damage to itself.

Development of such controls will be discussed in October *SAE Journal* by John M. Whitmore and John R. Burns, of Allison Div., General Motors Corp., who will describe the design and application of detonating-indicating equipment used on the Allison engine. They will reveal that this equipment not only indicates detonation limits, but functions as a danger signal, detects installation troubles, permits maximum power development with minimum hazards.

Getting back to the original idea of energy-saving for humans, they will tell how the instrument flashes warning lights on the instrument panel and will suggest that it may be connected to servo-mechanisms for automatic control.

The Cover

THE spirit of modern aircraft production has been caught by Artist Lili Rethi in the drawing of an aircraft assembly line which is this month's cover.

Atomic Bomb Opens "Age of Materials"

SHOT heard around the scientific world was that explosion of the first atomic bomb over Japan. Awe-inspiring herald of much that can be constructive or destructive, it may some day be regarded as marking the beginning of a new age in which the horizons of man's knowledge were extended to include the intimate details of solids.

For somewhat more than a century scientists have been developing reasonably complete and thorough understanding of gases and liquids, which are resolved into constituents with comparative ease. Solids resolutely have resisted scientific probing. Now it appears possible to explore even their constituent solar systems of atoms, electrons, protrons, and neutrons.

More important than whatever destructive may happen to the Japanese, is what is likely in a constructive way to happen to the world – and to solid materials – from here on in. Except for developments of comparatively recent years, man is not greatly advanced over earlier civilizations in the availability of solid materials. Wood, iron, lead, copper – all were anciently as widely used in decadent Damascus as currently in dynamic Detroit. The uses may be different, but the materials fundamentally are similar.

Whether the changes of the dawning "Age of Materials" will be produced by electronics or atomics probably is less significant than that there will be changes. For those interested in future roads to travel, signposts will be erected by Robert D. Heidenreich, of The Dow Chemical Co., in an October *SAE Journal* article treating of electron microscopic studies of the surfaces of solids. He will describe his work as an initial step toward X-ray and electron diffraction, which promise to yield a wealth of new information.

Scratching the surface, Mr. Heidenreich will indicate, produces much more than a bromide. Polishing and grinding metallic surfaces, for example, are operations which, the electron microscope reveals, create veritable metallurgical transformations, chemical and physical changes, such phenomena as extremes of temperature, however temporary. Surface layers of steel, subjected to such treatment, appear to produce substances differing widely from the bulk material.

These findings become somewhat more than academic when their objective is fundamental knowledge of factors affecting bonding and corrosion.

PLAN STANDARDS FOR AIR SAFETY

POSTWAR problem of tremendous proportions is that of establishing international airworthiness standards for aircraft. Involved are questions of sovereignty and freedom of the air, to say nothing of technology. Essential appears to be complete understanding between nations, and a high degree of international confidence.

While other nations have been occupied with a war which has been destroying their very doorsteps, the United States has been reasonably free to develop a pattern for these international standards, Edward Warner, vice-chairman, Civil Aeronautics Board, will say in October *SAE Journal*. This pattern may serve as a basis, postwar, for international understanding on the subject.

Whatever develops promises to be an interesting complication of ideologies, laws, and technologies. One point transcends argument and offers hope for early agreement – safety in flying anywhere and everywhere on the shrinking globe.

■

Probe Advantages Of Supercharging

FOR all that has been said about and promised for supercharging, this method of inducing an aircraft engine to believe it is continuing to enjoy the relatively rugged air of sea level, has its limitations.

Merely attaching a supercharger to an engine does not, it appears, automatically produce 100% efficiency. There are such subtractive factors as friction and power consumption by the supercharger, plus the pertinent fact that the skeptical engine seldom surrenders completely to the illusion.

Enlightening data on the advantages and limitations of supercharging will be presented in October *SAE Journal* by Kenneth Campbell, SAE 1945 Wright Medallist, and John E. Talbert, both of Wright Aeronautical Corp. Their article purports to be concerned chiefly with the relative merits of centrifugal and axial compressors for aircraft engines, but once these scientific whiskers are brushed aside a comprehensive technical treatise on the way of a supercharger with an aircraft engine reveals itself.

Both centrifugals and axials, they will say, have their limitations and advantages. This technical treatise will report findings developed from investigations begun in 1935.

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J. M. Crawford,
President

B. B. Bachman,
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John A. C. Warner,
Secretary and Gen. Manager

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29 West 39th St.
New York 18, N. Y.
Longacre 5-7174

Norman G. Shidle
Executive Editor

John C. Hollis
Business Manager

E. L. Carroll
Eastern Advertising Manager

A. J. Underwood
Western Advertising Manager
1210 General Motors Bldg., Detroit 2
Tel: Trinity 2-0339

SAE HEADQUARTERS
29 West 39th St.
New York 18, N. Y.
Tel: Longacre 5-7170

WEST COAST BRANCH OFFICE
530 West 6th St.
Los Angeles 14, Calif.
Tel: Vandike 3915
E. F. Lowe, Ass't. Gen. Mgr.

DETROIT BRANCH OFFICE
(for War Activities)
808 New Center Bldg.
Tel: Madison 7495
R. C. Sackett, Staff Rep.

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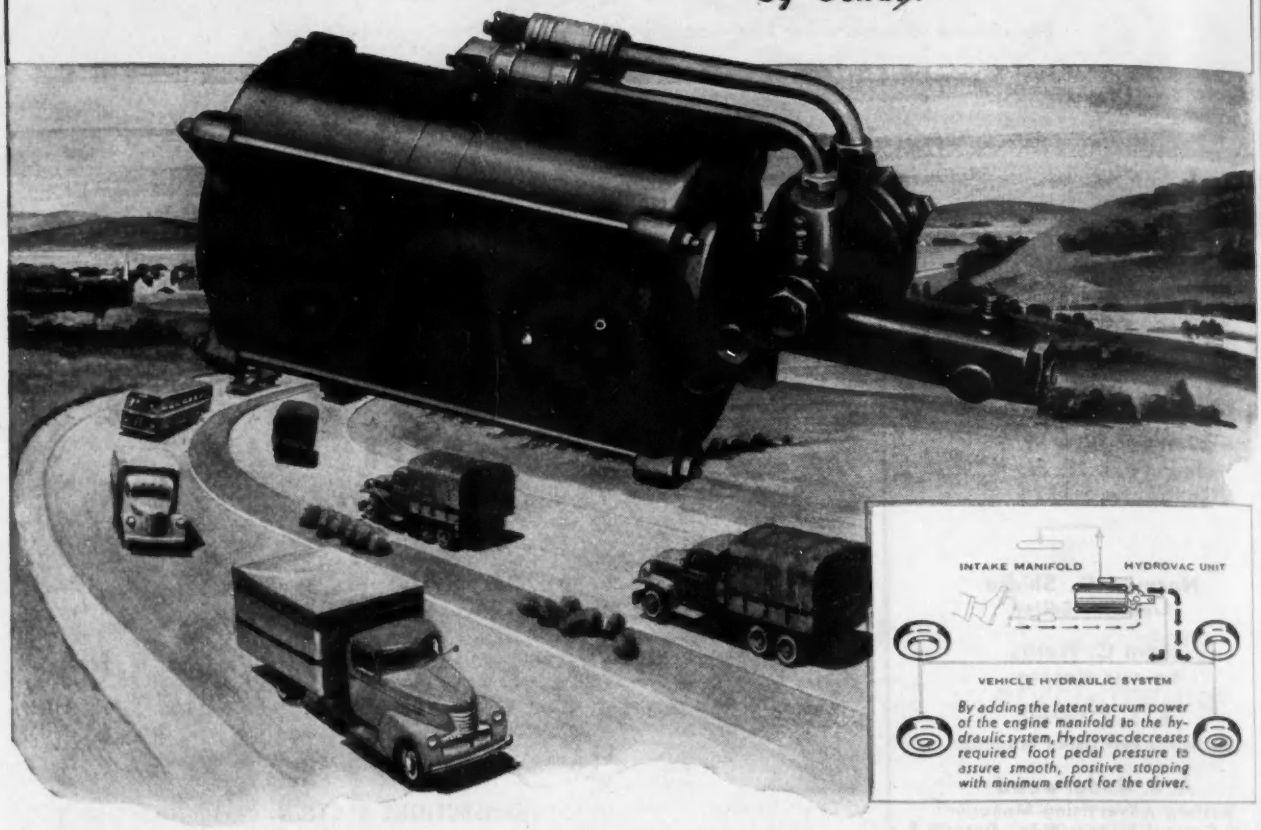
THIS IS HYDROVAC

By Bendix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News..

..OF THE SOCIETY

CORROSION PREVENTION Project for Army Combines Efforts of 150 Industry Experts

TRUCKS, tanks and other automotive equipment probably have been hit harder by the ravages of corrosion in the south and west Pacific areas than by all the shells and explosives of the combined Jap army, navy and air force.

Never before has equipment been subjected to such rough service and such adverse conditions. Out of reach of mechanical maintenance and repair shops when they first arrive on the scene of a campaign, driven to the limit of endurance just like the GIs who handle them, run in the salty ocean water when landing, often fished out of sunken landing ships and subjected to degrees of humidity unheard of in other parts of the world, there was simply no past experience in industry or the army that could have warned the designers, engineers and manufacturers of what they were up against to keep military equipment operating.

Vital parts were corroding and rusting out literally over night.

Something had to be done, and done quickly, so the Ordnance Department requested the War Engineering Board of the SAE to bring together the best men in science and industry and prepare a Manual on the Corrosion Proofing of Military Vehicles.

A. T. Colwell, Thompson Products' vice-president, was named W.E.B. sponsor. General chairman of the Corrosion Proofing Committee is J. L. McCloud, Ford Motor Co. Chairman of the Component Parts Subcommittee is M. R. Denny, General Motors Overseas Operations, while V. M. Darsey, Parker Rust Proof Co., is chairman of the Materials and Processes Subcommittee.

A staff of officers from OCO-Detroit, under the direction of Ordnance Project Officer Capt. L. G. Klinker, searched Ordnance files for every available field report bearing on corrosion. Officers were dispatched to major receiving and repair bases throughout the United States where returned materiel is rebuilt and overhauled. Reports were assembled, correlated, digested and presented to the committee broken down in order of the seriousness of trouble according to component parts and assemblies.

The priorities as submitted for study and recommendations, in order of their importance, are as follows: (1) carburetors; (2) hulls, bodies, sheet metal; (3) exhaust systems; (4) tracks and suspensions; (5) starting motors, generators and regulators; (6) wiring harness, high and low tension cable; (7) magnetos, distributors, controls; (8) instruments, instrument carriers; (9) switches; (10) battery hangers, boxes and terminals; (11) fuel lines, pumps, throttle, accelerator, choke and filters; (12) fuel tanks, fillers and fuel tank filler caps; (13) brake parts; (14) engine and clutch; (15) cooling and oiling systems, and (16) transmissions, final drive, propeller shafts and universal joints.

A separate subcommittee was set up for each of the foregoing priorities. Two problems were considered by each, namely, recommendations covering corrosion proofing to be done in the field to vehicles already in service, called "Field Fixes," and recommendations covering corrosion proofing at the time of manufacture, called "Production Fixes."

The job undertaken by each of these component parts groups called for reporting the kinds of materials used in the manufacture of each part, its operating functions, the kind of corrosion proofing methods already in use and any suggested changes and improvements in materials and corrosion proofing processes.

These reports were turned over to the Materials and Processes subcommittee made up of outstanding representatives of platers, metal finishers, paint and chemical manufacturers. This subcommittee was in turn divided into two groups: a Chemical Finishes Group and a Plating and Metal Finishes Group.

These groups reviewed the recommendations of each of the sixteen Component Parts groups, and from their broad experience prepared what they believe to be the best possible methods known for satisfactorily proofing each of the many hundreds of parts against corrosion. Recommendations for Field Fixes include specifying the equipment which the Army will need to provide for its maintenance crews in the Island Bases.

Completed recommendations of the Materials and Processes subcommittees are again submitted to the Component Parts groups for their final approval of the recommended processes from the functional standpoint of the parts involved.

With this last double check the recommendations are then submitted to the members of the War Engineering Board for their approval and then to the Ordnance Department.

Close to 150 engineers, metallurgists, chemists, chemical engineers and other specialists have been engaged in this worthy project from which all who have worked on it agree will come information and data of immeasurable value to industry as well as to the Army.

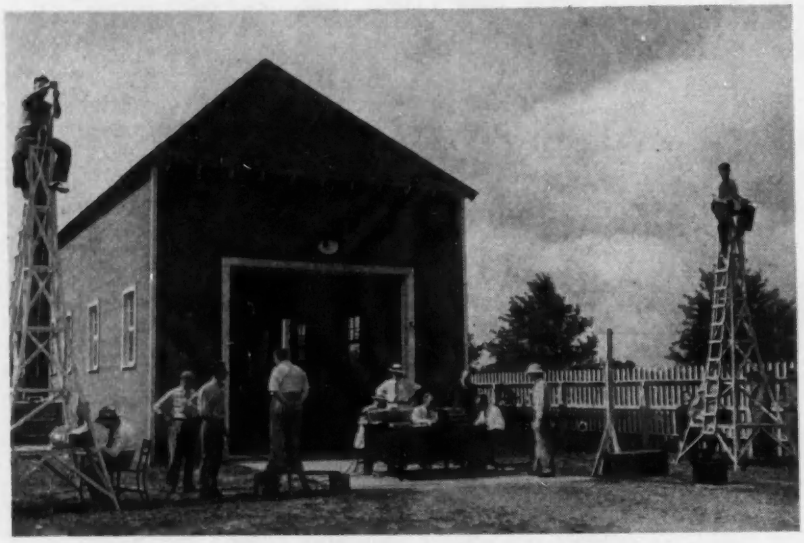
Recommendations covering the Field Fixes, which are most needed, are completed. Production Fixes will be slower in coming because of differences in materials, processes, and equipment used in the various manufacturing plants.

SAE Military Services To Continue Postwar

End of World War II will mean beginning of expanded, intensified automotive engineering advisory services whereby SAE will aid military in keeping American armed forces ahead of potential enemies in conception, development, and production of motorized military equipment. Mutual plans contemplate perpetuation of functional teamwork of industry and Ordnance engineers on organizational framework provided by SAE.

Background thinking visualizes military ground vehicles as vitally important in future war theaters, and increasing substitution of horsepower for manpower to give American forces extremes of mobility, firepower, protection, and combat superiority.

VEHICLE RADIO INTERFERENCE STUDIED BY SAE COMMITTEE



Radio Noise Suppression Laboratory of the Delco-Remy Division, General Motors Corp., near Anderson, Ind., where the joint SAE-RMA Committee on Vehicle Radio Interference has done a good deal of its important work. The four antennae are tuned to different wave lengths and cars and trucks, parked 50 ft from them in the foreground (out of the picture) are throttled at high rpm and readings recorded of the interference created.

DURING the week of July 9 the SAE subcommittee of the Joint Society of Automotive Engineers-Radio Manufacturers Association Committee on Vehicle Radio Interference met at the Delco-Remy Radio Noise Suppression Laboratory just outside of Anderson, Ind.

The subcommittee members are Phil Kent of Chrysler Corp., chairman, Jack Little of Chevrolet, secretary, Les Beltz of Packard, Fred Stromatt of Willys-Overland, K. L. Swarthout of Ford, Earl Wager of Studebaker, Herman Hartzell of Delco-Remy, Bill Schneider of Auto-Lite, A. V. Nicol of Philco, and M. E. Piper of Colonial Radio Corp.

About twenty additional engineers were present representing the automobile, truck and Radio Industries, the Associated Police Communications Officers and the Army Signal Corps, to conduct tests on several makes of automobiles and trucks, to determine how much suppression each vehicle would require to reduce radio interference to a tolerable value.

Prior to the meeting, an invitation had been issued to the chief engineers of each automobile and truck manufacturer to submit a representative vehicle for test, and several companies took advantage of the opportunity to submit cars or trucks and have their engineers present to observe the results.

The radio industry is looking forward to a large expansion in the use of television, frequency modulated radio, and other high frequency communication systems after the war. Automotive ignition systems radiate electromagnetic waves in the same frequency range as the high frequency communications systems, causing interference or disturbances in the reception of television pictures and radio programs.

In February, 1944, a Joint Committee was organized by the SAE-RMA, with H. C. Forbes of Colonial Radio Corp. as chairman (later succeeded by K. A. Chittick of RCA), to study the problem of automotive vehicle radio interference, along with the susceptibility of television and radio receivers to such interference. In addition, it was necessary to investigate and develop instrumentation for measuring the interference.

Three subcommittees were appointed: A Vehicle Radio Interference Subcommittee, as previously noted, a Receiver Subcommittee with Dorman Israel of Emerson Radio as Chairman, and an Instrumentation Subcommittee, with Jerry Minter of Measurements Corp. as Chairman.

These Subcommittees have held several meetings to study their individual problems. In November, 1944, a meeting of the Joint Committee was held at Rye, N. Y., at a location within range of both Television and F.M. transmitters, in order to set up tolerable limits of interference at known distances between the vehicle and the receiving antenna.

The recent tests at Anderson were a continuation of this program.

Personnel Need for New PICAO Secretariat

The Provisional International Civil Aviation Organization is now inviting applications for possible employment with its secretariat, SAE Past-President Edward Warner, vice-chairman, Civil Aeronautics Board, has informed SAE Headquarters.

Mr. Warner has been named as the United States representative on the Council of the new international organization, which is being established with headquarters in Montreal under terms of the agreement reached at the Chicago Civil Aviation Conference of last November.

The secretariat will probably include persons skilled in the several technical specialties of aircraft airworthiness, the qualification and licensing personnel, and the facilities and organizations of air routes, including requirements with respect to airports, air navigation aids, air traffic control, wireless communications and signals, meteorology, aeronautical maps and charts, and air navigation notices and other airway publications. Also needed will be personnel especially qualified in analysis of the economic, statistical, legal and operational phases of air transportation, and administrative personnel qualified in recording and preparing minutes of technical committees, in public relations, accounting and financial control.

Definite offers of employment can be made only by the officials of the international body after their appointment, Mr. Warner explains, but urges that applicants communicate with him at the Civil Aeronautics Board, Washington 25, D. C., as soon as possible. A brief statement of qualifications should be enclosed, indicating, in addition to the customary information, knowledge of foreign languages, and the names of five references.

Aero Drafting Manual Issue Date Is Set

SAE committee S-1, Aeronautical Drafting Manual, at their meeting on Aug. 2 and 3, agreed to set March 1, 1946, as the date for issuing a new and revised Aeronautical Drafting Manual. This new manual is to include Aeronautical Drafting Standards for the propeller, accessory and engine manufacturers, as well as the airline operators.

The committee has worked intensely for the last few months in an effort to accumulate and finalize all the outstanding data and projects so that they can be incorporated in the new manual. It was agreed by the committee that the manual would not be held up beyond March 1 to include any projects which will not be completed by that time.

The members of this committee are: Otto E. Kirchner, chairman, American Airlines, Inc.; W. B. Billingham, Hamilton Standard Propellers; Paul G. Clark, Curtiss-Wright Corp. Propeller Division; John Dzielinski, Ranger Aircraft Engines; L. R. Jones, Bendix Products Division, Bendix Aviation Corp.; W. D. Hazlett, Aeroproducts Division, GMC; R. S. Kellogg, Packard Motor Car Co.; J. G. Perrin, Pratt & Whitney Aircraft; C. R. Reynolds, Allison Division, GMC; P. V. Richards, Wright Aeronautical Corp.; H. F. J. Skarbek, Breeze Corporations, Inc.; M. F. Thorne, Thompson Products, Inc.

Mr. John Perrin has been appointed to act as chairman in the absence of Mr. Kirchner, who is at the present time on a technical mission for his company.

It was announced at the last meeting of this committee that in answer to an invitation, the Society for Promotion of Engineering Education had appointed a representative to serve on this committee from the educational field. He is Professor S. B. Elrod from Purdue University.

Standardize Repair Tools

A PROJECT to standardize aircraft engine maintenance tools has been launched by Committee E-20 of the SAE Aircraft Engine Subdivision, which is working closely with the military services on the task. Priority is being given to those special maintenance tools in which the Army and Navy are most interested.

A survey has been made throughout the aircraft engine industry in respect to the use of heli-coil inserts for sparkplugs and for other uses on engines – such as stud and bolt replacements.

Proposed standards have been prepared for propeller shaft turning wrenches, and work is under way on approved stud drivers, such as will not damage the threads; connecting rod alignment fixtures; bushing pullers, and piston ring expanding tools.

The committee is not considering those tools that are commercially available but is concentrating its attention on special equipment.

A part of the project is to establish and issue recommendations on the optimum method of using these special tools in aircraft engine maintenance work.

Worth M. Tyler, Allison Division, General Motors Corp., is chairman of the new committee. Serving with him are M. P. Adler, Jacobs Aircraft Engine Co.; W. M. Arnold, Pratt & Whitney Aircraft; Thomas Frame, Aircooled Motors Corp.; J. C. Hertsch, Ranger Aircraft Engines; R. D. Hicks, Continental Motors Corp., and Ralph Ward, Wright Aeronautical Corp.

TWEC Debates Larger Tractor Front Tires

TOP ranking tractor engineers argued the pros and cons of larger front tires for tractors at the July 27 meeting of the Tractor War Emergency Committee and agreed to come to a meeting scheduled for Sept. 13 prepared for further discussion. Major questions are: Do tractor engineers want a larger tire? Do they want the same tire pressures? Do they want higher-grade steel rims? Discussions are being coordinated with proposed program of the Tire and Rim Association intended to apply to new designs. Further review of tire and rims lists is contemplated soon.

At the Sept. 13 meeting also is expected a report on the result of the tractor fuel test program which has been conducted by a Tractor Fuels Requirements Group of the Motor Fuels Division of the Cooperative Fuels Committee of CRC. TWEC representatives have been participating actively as members of the TFR Group.

The work of TWEC's Nebraska Test Code Committee was terminated at the July 27 meeting.

Student Branch News

MEMBERS of the SAE Student Branch of General Motors Institute visited the Forge Plant and Tank Transmission Assembly of the Buick Motor Division on June 13. Highlight of the field trip was a study of the problems of forging the crankshaft of the six cylinder diesel engine.

At the June 19 meeting of the SAE Student Branch of Purdue University Richard B. Shumaker, secretary-treasurer of the Branch, presented a paper on Allison Aircraft Engines. The motion picture, "Fight for the Sky," was screened for the group.

On Aug. 1 members of the SAE Student Branch of the Massachusetts Institute of Technology attended a meeting of the Institute's Combined Professional Societies. Dr. Norman J. Padelford of the Department of Economics and United States delegate at the San Francisco Security Conference gave a personal report on the highlights of the conference.

M. I. T. Professor A. R. Rogowski addressed the SAE Branch on Aug. 8 on the topic "Two Cycle Engines." Prof. Rogowski examined and illustrated the possible design of two cycle engines and discussed their application.

Harvey Freeman, chairman of the SAE Student Branch of Massachusetts Institute of Technology has been elected president of the M. I. T. Combined Professional Societies.

Chairmen and vice-chairmen of the M. I. T. Branches of nine professional societies serve in the organization of the Combined Professional Societies. As president of the C. P. S. Mr. Freeman will represent the nine societies on the Institute Committee, governing board of the school.

Functions of the C. P. S. are to foster the development of the constituent student branches of professional societies, to sponsor meetings of mutual interest to members of the various groups, and to administrate the Stratton Prize Contest for student paper presentation.

International Aero Standards Advance

TWO important international standardization projects by the SAE Aeronautics Division are under way for the unification of American and British sparkplug and propeller shaft end standards.

Salient point of the sparkplug standards unification is the thread tolerances of the plug, it was disclosed by a study made by Committee E-6, on Screw Threads. Representatives of the sparkplug and engine manufacturers agreed that, in order to obtain interchangeability, the sparkplug thread would be made to a standardized basic size, and the sparkplug hole varied. Drawings of the proposed threads have been circulated to the industry, and copies forwarded to the British Air Commission.

Compromises Made

In drawing up the proposal, members of the committee made a number of compromises which, with British compromises that are expected to evolve, will result in unification and interchangeability. In view of current design and production practices in both this country and in Great Britain, this proposal is considered the most practical that could be generally agreed upon.

Submit Proposals to Industry

Likewise, the project for the unification of American and British propeller shaft end standards has progressed to a point where Committee P-5, Dual Rotation Shafts, and Committee P-6, Revisions of Present Standards, have submitted their proposals to industry for comment.

Shaft end sizes, for both the dual and single rotation propellers, need to be interchangeable between American and British makes in the interest of economical maintenance of international air transportation, as well as an assurance of maximum production in case of any future war emergency.

The British use involute splines for the No. 40 and No. 50 sizes, as well as the larger shaft ends, whereas the American manufacturers have been using straight side splines for the smaller sizes. As a result, the committee has submitted a proposal for the involute form of spline for these two sizes to the industry for comment and criticism. Involute spline shaft ends of these smaller sizes will be known as No. 41 and No. 51.

The committee which undertook the sparkplug task is headed by Gustaf Carvelli, Wright Aeronautical Corp., and consists of R. G. Anderson, Aluminum Co. of America; G. L. McCain, Chrysler Corp.; C. J. McDowall, Allison Division, General Motors Corp., and J. G. Perrin, Pratt & Whitney Aircraft.

The propeller shaft end work was developed by the two Propeller Standards committees composed of the following experts: P-5, R. P. Lambeck, chairman, Hamilton Standard Propellers; C. W. Chillson, Curtiss-Wright Corp., Propeller Division; W. L. Greene, Engineering & Research Corp.; Stanley Maas, Republic Aviation Corp.; and T. B. Martin, Aeroproducts Division, General Motors Corp., and P-6 members who are Mr. Lambeck, chairman, Thomas Barish, Engineering & Research Corp.; William Hazlitt, Aeroproducts Division, General Motors Corp.; Mr. Maas, and J. H. Sheets, Curtiss-Wright Corp., Propeller Division.

British liaison on these and other SAE projects has been Flight-Lt. Douglas G. Moffitt, RAF, British Air Commission, Washington, D. C.

New SAE Placement Bulletin Published

"THE sole purpose of the SAE Placement Service is to bring together the SAE member who is looking for a job and the employer who has a job to be filled," SAE Placement Committee Chairman Walter Bishop points out in announcing publication of a new pamphlet describing the facilities of the Placement Service.

Designed as a brief information piece for Placement Committee Chairmen of SAE Sections, for employers utilizing SAE placement services, and for SAE members interested in using such services, the pamphlet will be available on request from SAE Placement Department, 29 West 39th St., New York 18.

Stressing the aim of the Placement Department to keep pace with the demands of the postwar period for intelligent liaison between technical jobs and men who can fill them, the pamphlet details the means by which information is issued to interested members, how contacts with employers are established and notes the existence of "confidential listings" to meet the needs of some members.

It outlines for the employer how jobs are listed for his convenience, how information about prospective employees is made available to him and points out that, upon request, he may obtain the detailed experience record of any man listed as available.

COMBAT TESTS OF SYNTHETIC TIRES

Reveal Products' Strength Despite Unperfected Status

by MAJOR J. J. ROBSON
Office of Chief of Ordnance-Detroit

■ Detroit, June 4

(Excerpts from paper entitled "Rubber at War – Experience in European and Mediterranean Theaters")

INFORMATION on the serviceability of synthetic rubber products was urgently needed in 1944 to carry forward the mission of developing adequate tires from other than natural rubber. I studied this situation in Italy, France, Belgium and as much of Germany as we held at that time, and discovered that roads, terrain, heavy loads and long runs at high speeds combine to present in combat a severe service test of rubber products.

Considering the large production groups of Army tires covering the 6.00-16 used on the jeep, the 7.50-20 on the 2½-ton 6x6, and 9.00-16 on the ¾-ton 4x4, and 1½-ton 6x6, it was decided that all of these tires gave very good results in synthetic rubber.

It was found, however, that transportation-type hauling with heavy tractor trailer units produced tread-cracking in synthetic tires. This was particularly true in hot weather in Italy. Though the condition is not as pronounced in France and Belgium, it still exists, as seen in Fig. 1.

Tires on the amphibian DUKW are very flexible 11.00-18 tires with thin threads and relatively light carcasses to give maximum sand mobility. They must also operate at pressures as low as 12 psi to cross soft, sandy beaches. It was gratifying to see these tires doing a good job.

A severe problem encountered with tires in combat is that of the debris of war, such as shell fragments, pieces of metal and an endless variety of miscellaneous materials which seems to be everywhere. The results of picking up such debris are the loss of thousands of tires, many of which are damaged beyond repair. Fig. 2 shows a part of one day's collection removed from tires at a repair shop.

Army Abandons Buna Rubber

Synthetic rubber tubes, using GR-S (buna type) synthetic rubber, did a satisfactory job on their initial application, but tore badly when punctured and were hard to repair. Thus, the Army abandoned production of this type and is now insisting that butyl synthetic rubber be used exclusively.

Rubber tracks, like tires, were given a severe test in the European and Mediterranean Theaters. The average life of a chevron-type crude rubber track was 400 to 500 miles, but in spite of the lower tread mileage of this track and the occasional blowouts that occurred, it was overwhelmingly preferred to the steel chevron or flat rubber types for the following reasons:

1. Traction is good off the road in mud and on grassy slopes. Flat rubber has no traction bar, and thus is unpopular.
2. Highway operation is good. Steel is regarded hard to control on paved turns and hills, and very bad on snow and ice.
3. Rubber tracks are quieter.

Bogie Tires Satisfactory

Bogie tires on tanks gave very good results, and half-tracks also did a satisfactory job. Steel tracks were hard on bogies, since they do not give the cushioning of rubber tracks. This has been overcome by the production of the rubber-backed steel track.

Half-tracks did a good job, producing about 1900 miles in the European Theater, and seemed to be fully satisfactory.

Maintenance and servicing were found to be on a high level, and special efforts are constantly being made to get the most out of tires.

An example of this is the Ordnance tire repair companies operating in the field. Hundreds of thousands of tires are being repaired and recapped and put back into service, and the equipment and operation is fully the equal of the finest shops in the United States.

There remains, however, a distinct need for military tires, since tire requirements for military use have risen to unprecedented heights. Supply lines have been long and transportation has been critical. Truck operations of a vast nature have been necessary to deliver the ammunition and rations and gasoline the armies must have.

The lessons learned from this experience with rubber at war taught us that rubber tires, like all other products which go into combat, must be made stronger and more durable than those produced for peacetime consumption.

While synthetic rubber has generally done a successful job in its combat test, further improvement is needed in larger synthetic tires.

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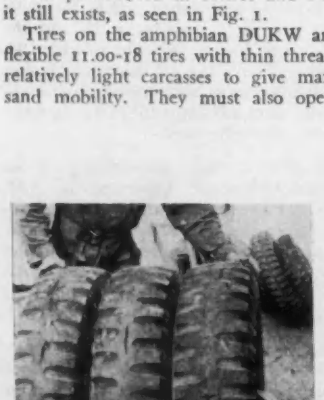


■ **Fig. 1 – Susceptibility of synthetic rubber to thread chipping and cracking, an example of which is shown here, remains one of Army's principal problems**

■ **Fig. 2 – Part of one day's collection of debris removed from tires at a repair shop. The results of picking up such debris are the loss of thousands of tires, many of which are damaged beyond repair. Unfortunately, there is little that can be done to relieve the situation**

Supercharging Key to Diesel Economy

by R. W. McLAUGHLIN and C. F. HARMS
Elliott Co.

■ St. Louis, May 15

(Excerpts from paper entitled "Putting Exhaust Gas to Work")

THE conception of a turbocharged diesel engine is based upon a combination of the chief engineering principles involved in internal-combustion engines, gas turbines, and centrifugal air blowers. Of this combination, the engine represents the principal factor in that it is the prime mover, and the blower serves the engine to enable it to perform better its basic function of producing power. The turbine can be made into a major factor in bringing about good overall operating economy, however, since it is able to convert otherwise wasted exhaust gas

energy into useful work in driving the blower.

In determining the amount of energy available to an exhaust gas turbine per pound of gas handled, numerous types of thermodynamic charts and tables are available; and in defining available energy we commonly refer to adiabatic energy. This is the energy made available by the expansion of a gas of a given initial temperature from an initial pressure to a lower pressure without any external heat having been added or removed during the expansion process.

The available means of determining available exhaust gas energy consists of:

a. Total heat-entropy charts drawn up for a typical exhaust gas by simulating in general construction the familiar steam charts.

b. Similar charts drawn up for air accompanied by correction curves to allow for the difference between specific heat ratios of the exhaust gas and air.

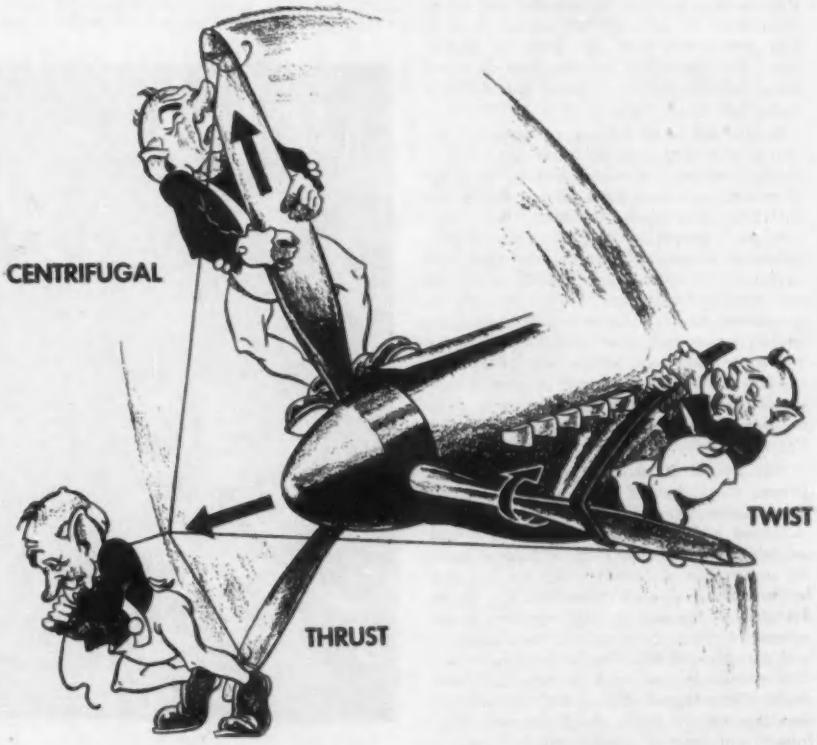
c. Straight calculation of adiabatic energy using a basic equation.

For an average mixture of engine exhaust gases at an initial temperature in the neighborhood of 1000 F, the average specific heat ratio is about 1.35 and the average specific gravity is little different than for air and is normally used as 1.0. The acoustic velocity under these conditions is approximately 1860 fps. Since the usual pressure drop across a turbocharged turbine is relatively small, it is normally impossible to reduce the exhaust gas temperature more than 10 or 15%.

In the process of testing a turbocharged engine, it is difficult, because of the pulsating conditions in the exhaust manifold, to obtain accurate measurements of the average values of either the pressure or temperature of the gas. In the now familiar Buchi system, instead of dumping the exhaust gas from all engine cylinders into a single manifold, and bringing these products of combustion to the turbine through one pipe, the exhaust manifold is divided into several passages, each of which serves as a direct connection between a few cylinders and one individual section of the turbine inlet nozzles.

Although it is difficult to design a turbine to utilize the energy in the pulsations of the engine exhaust, it has been shown that it is more efficient to utilize this energy in the turbine than to convert the high velocity waves into a high constant pressure condition by means of diffusion, then reconvert from pressure to velocity by expansion in order to turn the turbine.

Having properly selected a turbocharger for a diesel engine of ample mechanical proportions, the engine may be expected to operate at a very materially increased output (about 50% increase as compared with unsupercharged operation) without exceeding allowable operating temperatures and mechanical loading. Quick response to sudden changes in load, and good combustion and economy are also characteristics of the supercharged diesel. These achievements are now accepted as standard features of diesel engines with existing moderate supercharger pressures, but improvements can possibly be obtained by increases in supercharger pressure. Increased exhaust pressure is also under consideration, up to the extreme case in which, with very high pressure, the entire power output is taken directly from the gas turbine shaft, leaving the diesel engine to act as combustion chamber for the turbine, with only enough power available at the engine shaft to drive the supercharger.



Summation of principal forces acting upon a propeller

CHANGE-PITCH PROPELLER FAVORED

by JOHN D. WAUGH, Curtiss-Wright Corp.

■ Metropolitan, April 5

(Excerpts from paper entitled "A Study in the Development of Automatic and Controllable Propellers for the Light Plane")

FOR the past 25 years engineers have labored to design a propeller in which pitch change is accomplished automatically by the action of natural forces to which any operating propeller is subject. The effort which has gone into this quest has provided aviation with the practical realization of feasible automatic and controllable propellers.

In general, any propeller of which the blades may be rotated in their sockets at the direction of the pilot and while the plane is in flight constitutes a controllable type.

Automatic propellers are of a class apart from all other types and unique in their distinction. The sole means of obtaining a blade angle change of the automatic is derived from the natural forces, centrifugal, thrust, torque, acting upon the propeller during operation. The true automatic has no connection leading from the pilot or the engine to any part of the propeller. The hub is simply attached to the engine shaft in conventional fashion and the propeller is ready to function automatically.

The above picture illustrates the summation of principal forces acting upon a propeller which, with torque, can be used to change blade angles automatically according to the aircraft and engine speeds and aircraft altitudes. To obtain this angle change is not especially difficult, but to balance the forces which control it so that the maximum benefit of variable pitch is obtained is a problem.

Results of over 10 different tests of variable pitch propellers (the pitch of which is varied by any means, or varies automatically) installed on light airplanes of 65 to 100 hp have been obtained, and are shown to have a wide range of values compared to fixed-pitch installations on the same airplanes.

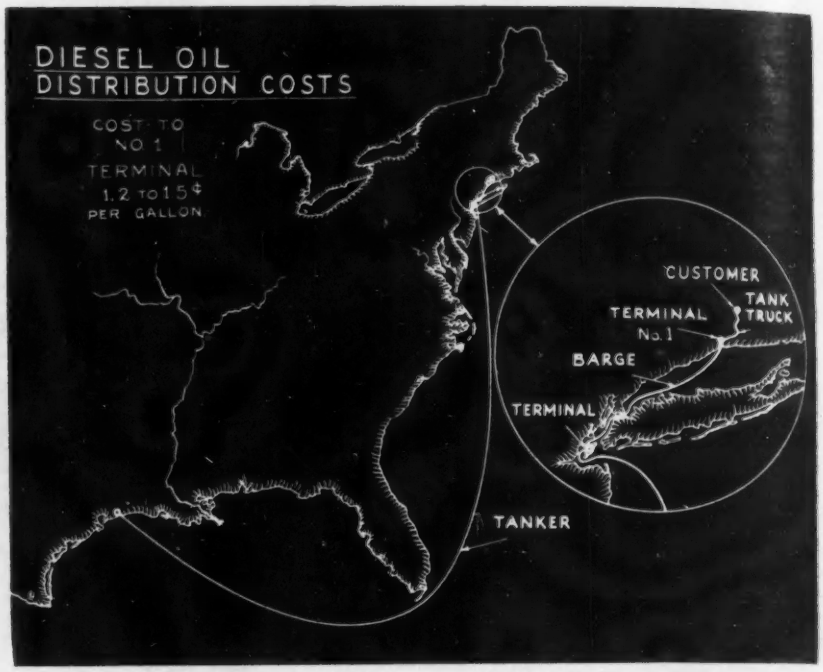
Static Thrust Increased

Static thrust in each instance was appreciably increased, from 10% up to 20% over the fixed-pitch type. Reduction in take-off run ranged between 30 and 45%, while the increase in rate of climb was between 25 and 50%. Sufficient conclusive test results have been obtained to indicate entirely

favorable increases in performance if variable pitch propellers are installed on almost every type of light aircraft except those of very low horsepower, or "powered glider" class. For aircraft in the 100 mph class and over, variable pitch is almost imperative if maximum performance is to be obtained.

In the matter of relative performance between fixed and variable pitch propellers, a family of typical light airplanes in the range of 100 to 175 mph basic design speed was analyzed. The study concluded that a variable pitch propeller made possible a 31% reduction in take-off run for the 100 mph airplane at sea level, and a 66% reduction for the 175 mph craft. The increase in maximum rate of climb for the 100 mph aircraft was found to be 36%, while for the 175 mph craft the increase was 38% from sea level. Also, the increase in service ceiling with variable pitch propellers was 24% for the 100 mph aircraft, and 11% for the 175 mph craft.

The weight of variable pitch propellers is greater than that of fixed-pitch types, but that is offset by performance increases. The increased safety of shorter take-offs and availability of greater engine power upon the occurrence of landing exigencies cannot be properly evaluated. However, if popular flying is to become a major activity, every means of furthering safety, mechanically, will encourage a wider embrace of air travel. Cost statements, so far, have only been estimates, the extent of the market and production expense not being clearly known. Airframe and engine manufacturers can do much to take advantage of variable pitch propeller development by considering the propeller in its initial designs. They will benefit from the adoption of these propellers due to the more efficient utilization of engine power and attendant economy.



Shown is a typical routing of diesel fuel picked up in Texas, shipped by tanker to the East Coast, taken by barge to a Connecticut port, and delivered by tank truck. A total of 1.2 to 1.5c might be added in peacetime to the refinery cost for each gallon before the fuel arrives at the last bulk terminal and is ready for filling into tank cars. Should it become necessary to deliver by tank truck, an appreciable additional cost would be incurred.

Drive on for Quality Oils

by W. M. HOLADAY
and W. S. MOUNT
Socony-Vacuum Oil Co., Inc.

■ St. Louis, May 15

(Excerpts from paper entitled "Discussing the Fuels and Lubricants Supply Problem")

THE petroleum refiner has the responsibility of taking crude oil and distilling or converting the hydrocarbons into fuels or lubricants best suited for use in a particular type of prime mover or heating system. Each type of fuel must carry its rightful load for processing and distribution. While fuels are being made which will give the final user the best economical return for his investment, convenience of operation is a definite factor in the price the public will pay, particularly for gasoline used in passenger cars. Each type of fuel must, therefore, assume its economic position with respect to each other fuel made from crude oil.

The diesel industry is going to face increasing competition for the straight run distillates which have been its best fuel source in the past. Insuring a fair share of these middle range hydrocarbons for diesel purposes will probably force the diesel user to pay a price on a par with or slightly higher than they are worth as charging stocks to catalytic units. Where separate storage and handling are desired, the extra cost must ultimately be passed along to the diesel, but segregation of fuels for diesels will probably be gradual, taking effect earliest at large terminals and where ordinary fuel oils are least useful for diesel purposes.

Many medium-speed engines will continue to draw fuel from heating oil stocks because of their less critical fuel requirements. The medium-speed engines and others having a cetane number requirement of 40 to 42 will enjoy a satisfactory supply situation because even many catalytic stocks are expected in postwar operations to fall in this quality range.

Compounded diesel lubricating oils seem to have a real place in the diesel future. Oil chemistry is expected to become more complex as additional functions are passed along for it to perform. A point of diminishing returns seems to have been reached in the processing of refining oils to take out the undesirable components, and best results are developing from building desirable properties into the oil through additives. Cost of additives has been a deterring influence, but the proved economics of quality oil usage provides incentive for expanding the compounding of diesel oils and use of higher concentrations of added materials.

Special Benefits Claimed for Aero-Threads

by G. C. BROWN
Aircraft Screw Products Co.

■ Kansas City, April 4

(Excerpts from paper entitled "A Development in Screw Threads")

SCREW threads are of such importance that the success of an engine depends largely upon the ability of the fastenings to hold the various parts together under the loads imposed during the operation of the engine.

There are two phases of the same screw thread idea: The Aero-Thread, which is a special form of screw thread basically intended to be used on heavily loaded fastenings where the standard form of thread is inadequate; and the Heli-Coil insert, which is intended for use with standard threaded parts.

Due to the protection given to the light alloy threads of the tapped holes, as well as to the improved thread groove form used on the screw member, the Aero-Thread screw system has the following advantages over other forms of screw threads:

1. It effectively protects threads in the light alloy against wear, abrasion or damage, thereby allowing unrestricted use of removable screw fastenings.

2. It insures that the designed screw fit is obtained when tight fitting screw studs are employed.

3. It produces screws or studs having greater tensile strength with a marked increase in impact and fatigue capacity.

4. It provides an antifriction thread surface which effectively prevents thread seizure, thereby allowing the tightness or looseness of the thread fit to be accurately controlled in manufacture.

5. The servicing of studs or screw is simplified since the insert protects the threads in the light alloy against wear, thereby eliminating the need for oversized screws and studs or for resizing the light alloy threads when replacements are required.

The system makes possible the salvaging of light alloy, bronze, brass, steel or cast-iron parts, although there may be a minimum of stock around the tapped hole. Connecting rod bolts, screws, cylinder hold-down studs, crankcase tie bolts, and crankshaft journal bearing studs are some of the applications where the Aero-Thread has proved to be a very satisfactory fastening.

The frequent suggestion that an insert similar to that used with the Aero-Thread be produced for use with the National Standard system led to the development of the Heli-Coil insert. Heli-Coil inserts have the same advantages as Aero-Threads.

Spark plug application to engines, particularly aircraft engines, is an interesting use of the Heli-Coil insert as it offers advantages not possessed by any other form of bushing, such as:

1. Not requiring an interference fit, and not shrinking in the head.
2. No pinning is required to lock them in position.
3. Cylinder head metal around the spark plug hole is not under stress.
4. No leakage around the outside of the insert as the plug gasket seals the thread and copper gasket flattens against aluminum.
5. A small hole required in the cylinder head results in a stronger head.

Replacing spark plug bushings in aluminum alloy cylinder heads of radial aircooled engines has long been one of the bottlenecks in aircraft engine servicing. The complicated and time-consuming procedure of removing the cylinder, and drilling out the bushing prior to installing a new one, has been largely eliminated by the use of Heli-Coil spark plug inserts. The method of installation is simple, and special tools make it possible to salvage a bushing in a minimum of time.

In the service repair of screw threads, especially on large parts such as crankcases, the most difficult operation is tapping the new thread for the insert. The difficulty is getting the thread square with the surface. Careful drilling out of the old thread to hold the center location and keep the hole square with the surface is essential. After drilling, the roughing tap should be started by gripping the shank in the chuck and turning the spindle by hand until two or three threads are cut. The rough tapping operation then can be completed by hand use of a tap wrench, followed by the finishing tap.

It is with assurance that the Aero-Thread screw thread system and Heli-Coil inserts are contributing much toward keeping our tools of war in good operating condition by strengthening screw threads in light alloys, and by salvaging thousands of parts that would otherwise be scrapped.

One Cylinder Engine Tests Gage High Altitude Cooling Needs

by MARCEL PIRY
Ranger Aircraft Engines

■ Buffalo, May 1

(Excerpts from paper entitled "Single Cylinder Engine High-Altitude Cooling Tests")

RAPID development of superchargers coupled with the availability of high quality aviation fuels has made possible high altitude operation with relatively small increases in engine sizes. Because of this, the engine designer is faced with the problem of providing adequate engine cooling for all powers at all altitudes.

As the altitude is increased, the required cooling air mass flows decrease for both the liquid and aircooled engines, due to the reduction in air temperature. However, the pressure drops required to flow the air through the radiators or finnings of these engines increases at greater rate as the altitude is raised because of the reduction in air density aggravated by the effect of higher temperature rises. With liquidcooled engines, the problem is more readily solved by increasing the size of the radiators, thereby providing larger cooling surfaces and air passage areas to remove the heat from the cooling medium. In the case of aircooled engines, the problem is more difficult because the air passage area is usually limited by the basic dimensions of the engine which, in turn, controls the spacing between the cylinders. Also, the heat rejection rate is limited because only a small temperature gradient can be tolerated across the cylinder.

Therefore, improvements can be effected only in the method of supplying the air to the fins by adjustments of the baffles and in the design of the finning. However, the latter approach is often limited by the manufacturing processes available.

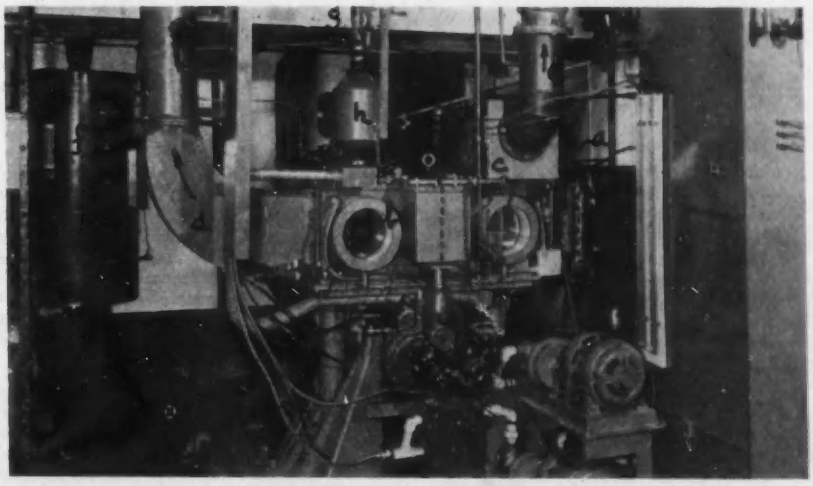
The ability to predict the cooling requirements of engines, while still in the design state, is a necessary requisit for the successful development of aircraft powerplants. As a result, many methods of computing the cooling requirements of an engine have been published. Methods of computation have been presented by the NACA for the estimation, from sea level test data, of the cooling air flows and pressure drops required at altitude. A single cylinder engine test was made aimed at the measurement of actual values of pressure drops required for satisfactory cooling from sea level to 30,000 ft altitude, and it was concluded that:

1. Published methods of computing cooling requirements at altitude from sea level data are reliable for this type of cylinder, and may be used by engine builders to evaluate the cooling characteristics of an engine in the early stages of development.

2. With relatively little equipment (conventional single cylinder engine installation) it is possible to develop the basic curves of an aircooled cylinder, namely: engine heat rejection versus indicated horsepower for specific fuel/air ratios, heat rejection factors of cylinder barrel, and head versus cooling air mass flows and cooling air mass flows versus the corrected baffle pressure drop.

With these sea level data the cooling engineer can then determine the exponents necessary to compute the cooling requirements for altitude operation. However, if major departures from conventional design have been incorporated in the cylinder, or the baffles, it would be advisable to investigate further the cooling characteristics under simulated altitude conditions.

3. The effect of temperature rise of the cooling air through the cylinder finning should be given consideration to fit each specific case. As a result, we found that



■ **Fig. 1 – Altitude box, consisting of (a) cooling air inlet duct; (b) downstream side of cooling air box; (c) exhaust gas low pressure compartment; (d) expended cooling air duct; (e) exhaust gas evacuation duct; (f) carburetor air measuring tank; (g) carburetor; (h) surge-mixing tank**

with our cylinder and baffles more reliable estimates are possible by using the exit air density rather than the average density through the baffles.

4. The large difference between the operating temperatures of the cylinder head and barrel and their individual heat rejection factor exponents necessitate that these parts be treated independently. However, the overall cooling requirement of the engine should be based on the limiting portion of the cylinder assembly. It has been found that the cylinder head is the limiting portion of the cylinder at altitude.

5. It was noted during this investigation that there is a small variation of volumetric efficiency with altitude. This fact, verified by subsequent tests, is in contradiction with the generally accepted belief that a substantial gain is always obtained when the altitude is raised. This suggests that the inherent design characteristics and timing of the cylinder have an important effect on engine behavior at altitude, and that each engine design and timing warrant investigation before generally accepted correction factors are applied.

6. In the performance of simulated single cylinder altitude test, the investigator is faced with many complex problems. One which proved to be particularly troublesome consisted of isolating and eliminating the air leakage resulting from the wide pressure differentials between the outside and inside of the system.

It is important for investigators to remember, when conducting such tests, that the design of the altitude box (see accompanying photograph) and duct work must be carefully planned with regard to minimum sources of air leaks. Unless this precaution is followed, air leakage from the outside to the inside of the altitude box will occur.

The air box should be provided with an observation window for visual inspection during operation.

The air box should be made as light as feasible with the pressures involved so as to avoid bulky and cumbersome installation in order to facilitate subsequent removal and servicing.

Although seemingly unimportant, the design and manufacture of cylinder baffles should be performed with great care so that frequent removals do not change the flow characteristics.

The measurement of air and fuel flows should be held within closer tolerances than for routine testing, owing to the large effect of fuel air ratio on the cooling requirement of an engine.

Control Cabin Design Has Complex Problems

by KENNETH C. GORDON
Boeing Aircraft Co.

■ 1945 War Engineering-Annual Meeting

(*Excerpts from paper entitled "Control Cabin Development"*)

THE following items influence the design of a control cabin:

1. The type of operation for which the aircraft is intended.

2. Space limitations as dictated by fuselage shape and harmonization with space layout of remainder of airplane—usually also influenced considerably by aerodynamic considerations.

3. Instrumentation required and communication equipment required.

4. Customer recommendations and/or expressed definite requests.

5. Previous flight experience in similar aircraft as reported by customer and manufacturer flight personnel.

6. Applicable specification requirements, customer, military or civil.

7. The personality and disposition of the vice president in charge of engineering, the chief engineer, the chief project engineer and the project engineer, not to speak of the janitor who re-arranges the mock-up after everyone else has gone home.

Cockpit Described

The Army Handbook for Designers defines the pilot's cockpit as follows:

"The Pilot's cockpit is that portion of the airplane occupied by the pilot and assistant pilot, from which all controls radiate and in which furnishings, instruments and equipment must be installed in positions accessible or visible to the pilot or to the pilot and assistant pilot as the case may be."

The design of the cockpit is covered by the following paragraph:

"The cockpit shall be so designed and arranged as to permit the unimpaired movement of the air control elements throughout their specified ranges, with maintenance of the clearances specified in Paragraph 82F. The width of the cockpit, windshield and cowling ahead of the cockpit shall permit vision angles consistent with comfort, protection and proper aerodynamic shape."

From these general criteria the design engineer must develop a control cabin arrangement which is not only practical from a functional standpoint but which is also arranged to further the best interests of safety, optimum pilot technique, ease of maintenance and sound engineering principles.

The importance of a successful control cabin solution cannot be overemphasized for it is here that the pilots spend virtually all of their time in flight and therefore design decisions intended to minimize pilot fatigue will pay dividends in increased pilot efficiency, better pilot technique, a corresponding increase in safety together with improved pilot health. All of these items have a direct bearing on the reputation and ultimate success of a sound airplane design.

Design Features

In addition to a sound control cabin arrangement, the following general features should be considered in arriving at design decisions:

1. Comfortable seats. These should be fully adjustable including a tilting or reclining back.

2. Adequate soundproofing.

3. Attention to interior finish. Cockpit interior should compare favorably with that used in passenger compartments; however, bright trim should be avoided to prevent undesirable light reflections.

4. Proper heating and ventilating.

5. Adequate visibility, which should include provisions for de-icing windshield surfaces.

6. Windshield structure. Design consideration should be given to the problem of providing adequate structure to prevent injury resulting from inadvertent collisions with migratory fowl.

7. Functional instrument panel arrangement.

8. Sensible arrangement of levers and tab controls.

9. Seating arrangement designed to promote coordination between crew members.

10. Attention to detail design.

There is no "open sesame" to control cabin development. Boeing engineers have long been impressed with the importance of reaching a proper solution and in general have adopted the following procedure with better than average success:

1. Design control cabin to be consistent with operation for which the aircraft is intended.

2. Allow as much room as required to accommodate the crew comfortably. More room is desirable if economic and aerodynamic aspects will permit; however, it must be remembered that both above considerations are intimately involved in the keen competition between airplane designs for best utilization by operators.

3. Make rough layouts to establish basic conception.

4. Make miniature mock-up to demonstrate practicability of various contemplated configurations.

5. Obtain customer recommendations and modify mock-up accordingly.

6. After consensus has been obtained make full size mock-up for further development, from which a final configuration should be reached.

A new arrangement which has certain fundamental advantages for consistent long-range operation is the pilots' instrument board. These boards will be greatly simplified and confined to the most optimum arrangement of flight instruments and strategic engine instruments, thus leaving greater open areas available for forward visibility. The brighter and more general lighting desirable for routine observation of engine and miscellaneous functions by the engineer will be separated and remote from the softer lighting of the pilots' instrument boards and can be more easily separated from the pilots' station by use of curtains without isolating the engineer from the pilots.

The complication of pilots' control stand and overhead switch panel may be reduced by location at engineer's station of all miscellaneous controls and switches not necessary to pilots' activities.

From comments we have obtained it would appear that the instrument standardization program, while of benefit to instrument manufacture, does, however, tend to be confusing to pilots who must segregate specific instruments from a large board containing 50 to 70 instruments all having the same exterior dimensions.

Also considerable duplication results from the present system of building up instrument boards which might be eliminated if consolidated or integrated instrument board units could be made available. An illustration of this is our Stratoliner instrument board which contains five ball bank indicators including those on gyro instruments. These might well have been reduced to two if any integrated instrument board somewhat similar to that on a modern automobile could be developed for aircraft use.

SAE

Technical Boo

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ard
A.T. Colwell
R.M. Hazen
L.R. Buckendale
chairman
R.H. McCarroll
Arthur Nutt
C.R. Paton
R.W. Young
J.C. Zeder

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Chairman of the Engineering Board, Chrysler Corp.

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* *Two additional members are to be appointed.*

A Message from The President

It is my privilege to announce the initial membership of the newly established SAE Technical Board.

This board is empowered to exercise general direction and supervision over all SAE technical committee activity. It will function both as a main spring and a balance wheel in guiding and administering the engineering advisory service to industry and Government which SAE technical committees have rendered so effectively in war and peace.

In selecting the personnel of the Board, it was Council's concept that members "must be of outstanding caliber, that they individually and collectively must work diligently in the interests of the SAE, that they must individually have outstanding prestige in their particular fields of endeavor, and must collectively cover adequately the whole field of SAE activities and possess executive and administrative ability."

It is my feeling, as it is that of others who worked in development of this new plan of organization, that membership in the Board is perhaps as great an honor as is within the power of the Society to confer.

The whole concept of the new Board's operation involves a gradual, rather than a sudden, detailing of the steps toward effective coordination of the SAE's various technical committee operations under the Board's broad grant of authority.

James M Crawford

President, Society of Automotive Engineers

Electrical Loads on Planes Seen Growing

by AUSTIN F. TRUMBULL
United Air Lines, Inc.

■ Kansas City, June 7

(Excerpts from paper entitled "Future Aircraft Electrical Loads")

THERE does not seem to be any doubt that aircraft electrical loads are on the increase, and that the increase is on a geometrical, rather than an arithmetical curve. In line with this increased use of aircraft electrical systems, and if the past experience of contemporary business means anything, our problem will be one of anticipating for what we might want to use the electrical system in the future.

We should seriously consider all-electric airplanes, commencing immediately in any new design of planes. This consideration should at least progress to the point of generating, distributing, controlling and transforming all auxiliary power electrically.

In the past we have made the mistake of thinking in terms of watts instead of kilowatts. This has made the electrical system an expensive luxury. The situation might be likened to driving your automobile only on Sunday afternoon. The cost per mile becomes very high. Electrical systems will not begin to show a profit until they are really given some work to do – some big job, such as air conditioning, cooking, supercharging, wing heating, and so forth. The 1200 w system in our present commercial planes could be added to some system to do a big job, and never be noticed.

The larger the power handled, the less the weight per horsepower for generation, conversion and utilization equipment. For example:

(a) A 30 kw alternator weighs about 75 lb. This is five times the power of a popular d-c generator for less than twice the weight.

(b) As we get out of the low and fractional horsepower utilization equipment, we quickly approach the "pound per horsepower" ideal. Even now there is a 1000 hp motor (on paper) that weighs only 350 lb – approaching 3 hp per lb.

(c) A 500 kw auxiliary prime mover with generation equipment is now under design, which is expected to have an overall weight of less than ¾ lb per hp.

Even electric propulsion of aircraft is already being seriously considered. One company has gone so far as to ask for quotations on the necessary equipment. Preliminary investigation indicates: (a) weight saving; (b) reduction in required power (due to reduced drag and more efficient location of propellers).

Certainly, with the improvements expected in gas turbines, electric propulsion is a very intriguing possibility.

Peak Utility Needed to Meet Airplanes' Operating Costs

by JOHN W. FRIEDLANDER
Aeronca Aircraft Corp.

■ Detroit, May 7

(Excerpts from paper entitled "The Operating Costs of Personal Airplanes")

There are no two operators who can really agree upon what is the cost of operating small personal aircraft.

One important factor, however, is that air travel saves approximately 18% in distance as compared with automobile travel. Treating operating cost figures, certainly the saving in time by using one's own airplane instead of other means of transportation must be considered.

The chief item in the final cost of airplane travel is based upon the amount of time flown; that is, the amount of usage the airplane will get. In order to bring this to a factual basis, I have taken the following fixed cost items for an airplane: depreciation, insurance and hangar cost. I have figured depreciation on the basis of 20% per year of the original cost of the airplane, and assumed that at the end of five years the airplane would have a residual value of 20% of its original cost. The insurance cost I have used is the average cost to a buyer of a new Aeronca airplane, this cost being the amount of insurance that he is required to buy in case he finances his airplane.

For hangar cost, I have assumed a rate which is standard throughout this part of the country, namely $15 per month for hangar service.

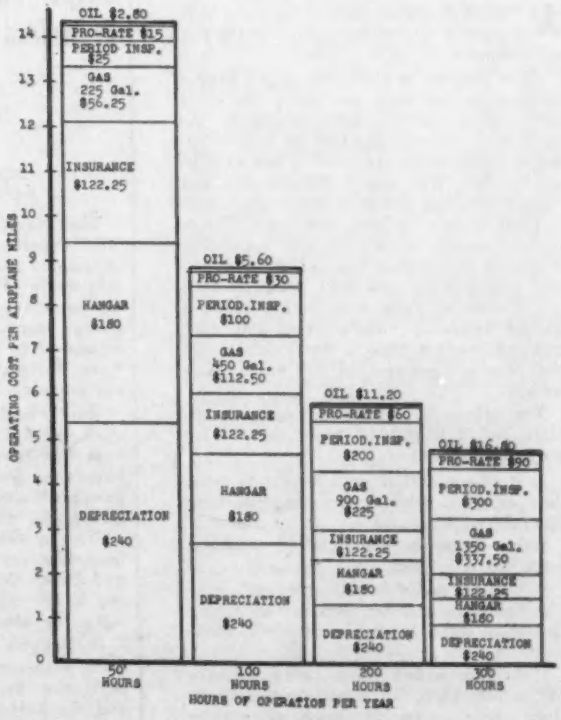
The variables I have considered are gasoline, oil, periodic inspections, minor repairs, pro-rating of a 500 hr major overhaul speed of the airplane, number of miles or number of hours flown per year, speed and the cost of the airplane.

If we use, for example, a typical pre-war airplane powered by 65 hp engine, listing at $2000, flying at a cruising speed of 90 mph, we find that if the airplane is used 50 hr per year, the cost per mile is 16¢. However, if this same airplane is used efficiently and is flown 300 hr per year, the cost of operation drops to 5¢ per mile. If that same airplane were to sell for $1500, the cost of operation per mile, 300 hr per year, is 4.7¢ per mile and at 200 hr per year, 5.7¢. The accompanying chart lists these data, and illustrates as well that a comparatively small variation of horsepower, speed and list price make but little difference in the cost per mile traveled if the airplane is used to its full utilty; that is, 200 to 300 hr per year.

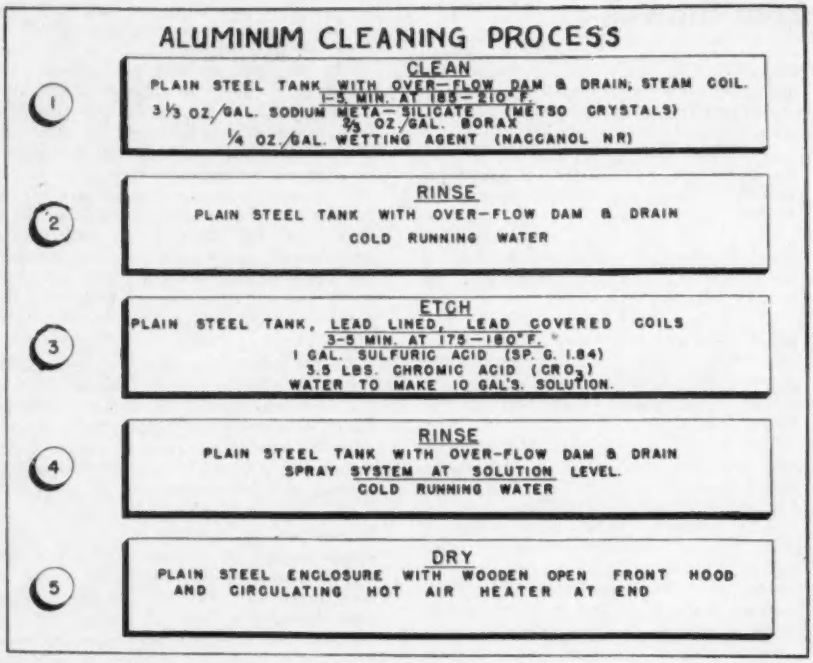
By the same token, one is drawn to the inevitable conclusion that if the airplane is not used very much, the cost per mile of travel, of course, is unusually high. Recall, however, that this is equally true of an automobile, a motor boat, or any other conveyance that one might own.

Therefore, the job is a fairly obvious one. It is to design, manufacture, and sell airplanes having the utmost utility for the private owner so that they can be used to their maximum efficiency, 200 hr use per year or more. This, of course, poses a problem for engineers and manufacturers. However, we believe that we are rapidly approaching an airplane of this nature: easy to fly, safe to fly, and economical to use.

One approach to increasing the airplane's utility has already been started – an active campaign on the part of the private aircraft industry to create throughout the country a series of airparks, landing strips, and suitable facilities to make the use of a private airplane more attractive than it is at the present time. Travel by personal aircraft, as a result, will be commonplace and worth whatever price it costs.



Effect of number of hours flown on cost of operating per mile for airplane selling at $1500 – 65 hp with cruising speed of 90 mph


ALUMINUM CLEANING PROCESS
1
CLEAN
PLAIN STEEL TANK WITH OVER-FLOW DAM & DRAIN, STEAM COIL.
1-5 MIN. AT 185-210°F.
3 1/3 OZ./GAL. SODIUM META-SILICATE (METSO CRYSTALS)
2/3 OZ./GAL. BORAX
1/4 OZ./GAL. WETTING AGENT (NACCANOL NR)
2
RINSE
PLAIN STEEL TANK WITH OVER-FLOW DAM & DRAIN
COLD RUNNING WATER
3
ETCH
PLAIN STEEL TANK, LEAD LINED, LEAD COVERED COILS
3-5 MIN. AT 175-180°F.
1 GAL. SULFURIC ACID (SP. G. 1.84)
3.5 LBS. CHROMIC ACID (CrO_3)
WATER TO MAKE 10 GAL'S. SOLUTION.
4
RINSE
PLAIN STEEL TANK WITH OVER-FLOW DAM & DRAIN
SPRAY SYSTEM AT SOLUTION LEVEL.
COLD RUNNING WATER
5
DRY
PLAIN STEEL ENCLOSURE WITH WOODEN OPEN FRONT HOOD
AND CIRCULATING HOT AIR HEATER AT END

Surface Preparation of Aluminum Alloys Mandatory for Distinctive Spotwelding

by H. A. MULLEN and L. BOELTER
Ford Motor Co.

■ Buffalo, May 1

(Excerpts from paper entitled "Aircraft Spotwelding at Willow Run")

ALUMINUM alloys comprise the great bulk of aircraft spotwelding, and our plant is no exception.

That progress in aluminum alloy's surface preparation has kept pace with the other developments is best demonstrated by the opinion of 10 years ago that the only cleaning required before spotwelding was to wipe off the dirt. With quality requirements and mass production demands in aircraft manufacture, it soon became apparent that specialized surface preparation was mandatory if quality spotwelding was to be consistently and economically obtained. After conducting a series of many tests, which included surface resistance measurements and electronic diffraction photos, we decided upon the process illustrated in the above illustration.

This process has been in use for over two years, and it is believed to be superior for the following reasons:

1. It is not critical with respect to time, alloy or gage, while there is a reasonable tolerance on temperature.
2. No smut is deposited on surfaces; hence, no nitric acid dip is required.
3. Cost per gallon is quite low.
4. Solutions may be used for very long periods of time before becoming contaminated.
5. Average surface resistances are not very low or very high, but reasonably consistent. Thus, there is an advantage of slightly higher weld strength than is obtained with very low resistances, but not the disadvantages of splitting and skidding, which are usually encountered in very high resistance.
6. Different alloy and gage combinations which go into the same assembly may be cleaned together simultaneously.

For the average production part, tooling and fixtures are kept at a minimum, made as simple and flexible as possible, and those of a permanent nature are avoided, because production requirements necessitated by the procuring agency's demands, as well as constant changes in design, dictate frequent and many changes in set-up and assignment. As most locating fixtures are suspended at the machine by the operator, weight and bulk must be kept as small as possible.

When a new part is designed, every effort is made to have it include welding in some form, if this is practical. Most of the old riveted parts have come under surveillance with the idea of converting to spotwelding, and on the 100 parts so converted, the procedure is as follows:

1. The welding department usually selects a part to be proposed.
2. The location of the proposed spotwelds are marked on masking tape which has been fastened to the part.
3. The part is sent to the chemical and metallurgical department for photographing. A hand-made part is then spotwelded and sent to the chemical and metallurgical department for tests on strength and weld quality, and a report of this is circulated to the concerned parties.
4. The form is prepared and signed by the welding supervisor, and then it is sent to the engineering department. Engineering attaches the Ford drawings and sends the folder to the stress department.
5. Two sets of drawings with the welded areas marked in red are then sent to Consolidated for approval. Following final approval, engineering prepares new drawings, incorporating the spotwelding, and the assembly is put on production.

When wing skins came under consideration for spotwelding, it was first necessary to determine the most desirable weld patterns for the particular combinations involved, so numerous tests were made in this respect. Large sheets of proper gages were put together in a lap joint, and a series of welds held them together. Then, according to blueprint which gave all dimensions, test bars which centralized the pattern as well as test bars of the parent metals were cut from the assembly. Test pieces and prints were sent to the chemical and metallurgical department where tests were made. When the most desirable pattern was determined from these tests, it was incorporated on the welding proposal.

The chemical and metallurgical department also runs endless series of tests of various types; such as, X-ray, cross section, shear, fatigue, corrosion, and so forth, on spotwelds to establish statistics and a source of ready answers, many of which in themselves are apparently insignificant, nevertheless contribute somewhat to the complete picture.

Expensive research projects are undertaken when practical, one of which was concerned with aluminum oxides produced by surface preparations as determined by electron diffraction photographs; the oxides being in such thin layers that they defy positive identification by other means.

Available literature discloses that there are nine known oxides of aluminum and these studies disclosed that at least four may be encountered in surface preparation processes prior to spotwelding. The findings also showed us that:

Ships Fortified by Welded Diesels

by LEO BERNER
Joshua Hendy Iron Works

■ No. California, May 8

(Excerpts from paper entitled "Welding a 500 Hp Diesel Engine")

The Navy, for reasons of shatterproof construction, requires small ship propulsion diesels and diesel-generator sets made of steel. Cast steel engines are more expensive and too slow in delivery; hence, a welded diesel engine, in answer to urgent war demands, has been designed and manufactured by our company.

The "Hendy" diesel is all welded, since the 6 or 8 cyl engine block, the hose and generator mounting, the exhaust manifold, the piping, control linkages, hoods, covers, platforms, and guards are all of welded construction.

From a welding viewpoint, the most important parts are the engine block and base. Generally, all of the welding in the construction of these parts is by the electric-arc process.

The engine base is made up from three subassemblies: The bearing support, the bearing support assembly, and the bottom assembly.

1. It is impossible to obtain an oxide-free aluminum surface by chemical means. This may be done only by mechanical cleaning.

2. Of the nine known oxides of aluminum, at least one is conducive to good spotwelding, but this is the only desirable one of the four encountered in chemical surface preparation.

3. Chemical surface preparation removes the natural oxide, depositing another, which may or may not give good spotwelding results, depending upon the oxide deposited.

4. Hot water is not desirable as a rinse, as it produces an undesirable oxide.

5. The etching solution now in use at Willow Run is very satisfactory in that it produces the desirable anhydrous oxide in as little as 1 and as much as 30 min, whereas most other solutions tested required from 3 to 15 min to produce the desired oxide and after 15 min the undesirable oxide re-appears.

Design Changes and Careful Handling Sharpen Aircraft Engine Performance

by R. D. HICKS
Continental Motors Corp.

■ Detroit, May 7

(Excerpts from paper entitled "Service Experience with Light Aircraft Engines")

MOST engine failures are due to operator abuse; inadequate mechanical margin, referring to a functional failure beyond the operator's control; and workmanship, which covers original parts in manufacture and assembly, and assembly in overhaul shops in the field, the latter being responsible for over 50% of all reported complaints.

While oil leaks account for the largest percentage of complaints, one of the more serious types of failure experienced in light airplane operation involves the induction system. Carburetor icing, uncertain acceleration, failure to idle properly, and tendency to die in glides or basic maneuvers are its more common manifestations. The remedy most readily available seems to be fuel injection or pressure-type carburetion, either of which will eliminate carburetor icing and provide positive handling.

Valve troubles present a major problem at this time, although valve performance was quite satisfactory before the war. Observations support the theory that so-called valve disturbances actually originate in the seat. If the difficulty is basically the sticking of valves due to gum or carbon formation on the stem, without prior seat damage, some relief has been afforded by counterboring the guide 1/16 in. oversize, from the inner end up to a distance equal to the valve lift. Cast-iron guides and bronze guides have been used without notable difference in results.

Cam wear is caused by the failure of the follower to revolve, resulting in a groove worn across the face. Depth of this groove will be from 0.0001 to 0.0015 in. in 600 hr of operation if the follower fails to turn. Changes in the shape of the cam and cam follower face can be made, which will insure rotation.

A type of piston failure quite common in light aircraft engines occurs with a small crack in the piston pin boss. Trouble of this type can be completely eliminated through small changes in metal distribution.

At present, most light engines are equipped with the solid skirt type of piston, with piston rings both above and below the piston pin and with piston skirt to cylinder wall clearance of 0.017 to 0.022 in. It is significant that there is considerable reduction in engine noise, especially at idling speeds, where the split skirt type piston is used. Pistons having all rings above the piston pin seem to be less susceptible to scuffing and remain in better condition than those having rings both above and below the pin.

Some of the crankcases used on the three light engines under discussion are made of cast aluminum and some of cast iron. All have shown structural weaknesses in greater or lesser degree.

Cracks are more prevalent in aluminum crankcases than in cast iron. The number of failures has been reduced substantially in both, by redesigning the internal webbing and improving the finish of the crankcase on the inside. Service experiences have made it clear that metal surfaces should always be cleaned of surface imperfections because in highly stressed regions the surface disturbances may act as stress concentrators.

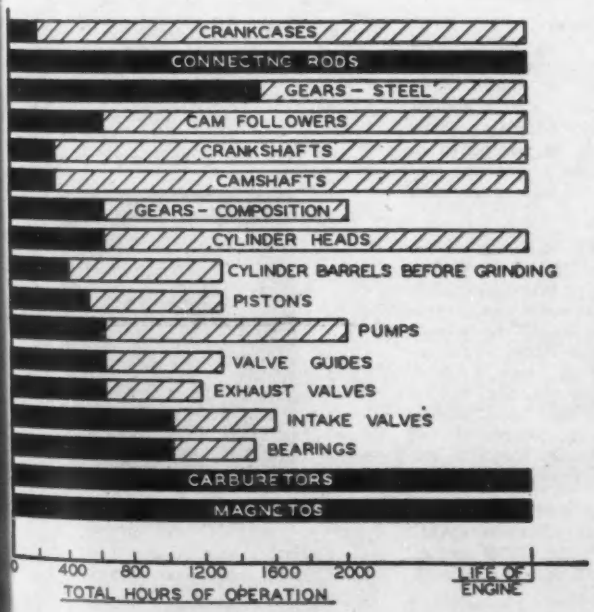
Crankshaft Breaks

Improper grinding of connecting rod journals often causes crankshaft breaks. Neglecting to blend the fillets into the pin as well as the crankcheeks and to give a smooth surface free of grinding checks greatly increases the possibility of failure. This improper regrind occurs only in field service overhaul where the shops are inadequately equipped or instructed.

It should be comforting to pilots to know that while any crankshaft failure is serious, there is not a great deal of danger associated with crankshaft failures of this kind. In almost every instance the engine will continue to operate even after the shaft is completely broken in two, giving the pilot time to maneuver the plane into a landing position. It is also seldom that additional damage to the engine results from a failure of this kind.

One manufacturer uses a nitrided crankshaft which seems to be highly satisfactory. A superior feature of this nitrided crankshaft is its wearing quality. Comparison of the crankpin journal wear on the nitrided shaft with that on one not so processed shows that the former will have only one-tenth the wear of the latter in a similar operating period. The advantage of having a hardened shaft has become especially apparent during the war, when operation under dusty conditions has been common.

The accompanying illustration shows the average life expectancy of the various engine components which have been in commercial service for the past several years. The solid portions of the columns represent hours of operation in which no appreciable number of failures occur. The light portions indicate the hours of engine life in which failures have been most frequent. It would be most desirable to have the solid portion of each column reach the 600-hr mark as a minimum.



Current endurance performance of various engine components which have been in commercial service for several years

It is believed that 25% of all complaints could be eliminated by the satisfactory installation and use of an efficient air filter. The unit commonly used on light engines at present is the oil-wetted metal screen type; however, a more efficient, quickly detachable filter is necessary on light aircraft. Also highly desirable is an oil filter for engine oil, preferably built into the engine, with inexpensive quickly replaceable elements.

Better insulating of the airplane from the torque reaction of the engine and other vibrations originating in the powerplant will reduce airplane as well as engine service complaints. Engine smoothness comparable to that of ground transportation units is a distinct possibility when these engine mounting improvements are effected.

turn to p. 37

Receives Legion of Merit in Paris

Major Robert J. Grow (right) is being congratulated by Major-Gen. H. B. Saylor upon receiving the Army's Legion of Merit award on May 11 in Paris. A former chairman of SAE Baltimore Section, Major Grow was cited for the preparation of "The Ordnance Standard Operating Procedure for Continental Operations" prior to D-Day

About S

ALFRED P. SLOAN has announced a grant of $4,000,000 from the Alfred P. Sloan Foundation for establishment of a Sloan-Kettering Institute for Cancer Research at the Memorial Cancer Center in New York City. **C. F. KETTERING** will concentrate on the organization of industrial techniques for application in cancer research. The project is a personal undertaking of the two men. Mr. Sloan has for some time been a trustee of the Memorial Hospital in New York and Mr. Kettering has been the sponsor of numerous medical research projects for a number of years.

IRVING B. BABCOCK, president of The Aviation Corp., assumed also the presidency of the Crosley Corp. last month following purchase of the latter organization by Aviation Corporation for $21,000,000. Crosley Corp. will retain its corporate identity. The sale included all of the Crosley interests except the automobile manufacturing division which Powel Crosley has retained.

PAUL G. HOFFMAN, president, Studebaker Corp. and chairman of the Committee for Economic Development, flew to England last month to attend the meeting of the International Chamber of Commerce in London.

Formerly assistant to the manufacturing superintendent, Hughes Aircraft Co., Culver City, Calif., **GUS A. SEIDEL** is now senior engineer in the maintenance department of Transcontinental & Western Air, Inc., Kansas City, Mo.

GERALD J. ZILZ is now a member of the U. S. Army Air Forces and is serving with the Air Technical Service Command, Wright Field, Dayton, Ohio, where he is a special combat observer. Before entering the Army, he was vice-president, Engineering Development Associates, Los Angeles, Calif.

Formerly a student member at the University of California, Berkeley, Calif., **Z. D. ROSE** is now an apprentice seaman in the USNR and is attending Midshipmen's School at Fort Schuyler, New York.

The appointment of **C. J. SMITH** as chief engineer of the Monroe Auto Equipment Co., Monroe, Mich., was announced recently by **B. D. McINTYRE,** president of the firm. In his new position, Mr. Smith will direct the company's widely expanded program

C. J. Smith

which now covers almost every branch of the transportation field. Mr. Smith comes to the Monroe organization after a number of years with Packard Motor Car Co., where, at the start of the war, he was placed in charge of the experimental engineering program at the tank arsenal proving grounds, Utica, Mich.

JOSEPH W. FRAZER, chairman of the board of Graham-Paige Motors Corp., has assumed the presidency of that organization and has also become president and general manager of a new company, the Kaiser-Frazer Corp. The Kaiser-Frazer organization will produce on the Pacific Coast a lightweight, low-cost automobile to be known as the "Kaiser" and in Detroit a medium-priced car to be known as the "Frazer." Chairman of the board of the new corporation will be Henry J. Kaiser.

Formerly a student member at the Case School of Applied Science, Cleveland, **CARL J. ALBERTZ** is now in the USNR and is attending Midshipmen's School at Columbia University, New York City.

H. E. SIMI, a former SAE vice-president, has joined the staff of Kenworth Motor Truck Corp., Seattle, Wash., to take charge of bus engineering and production. Chief engineer of the Twin Coach Co., Kent, Ohio, for 16 years, Mr. Simi comes to Kenworth from Timken-Detroit Axle Co., where for the past two years he had been in charge of development of postwar axles. In his new position Mr. Simi will have complete charge of the continuing development and expansion of the bus program of the Kenworth organization.

GUSTAV INGOLD now holds the position of adviser-supervisor at St. Louis Ordnance Depot, St. Louis, Mo., where he will supervise the civilian personnel of the Ordnance Section within the Fifth, Sixth, and Seventh Service Commands. Mr. Ingold was formerly chief adviser at the Ordnance Office, First Service Command, with headquarters at Boston, Mass.

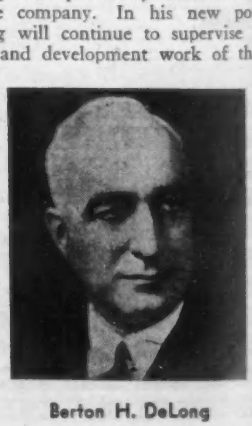
Formerly president and general manager of Kinner Motors, Inc., Glendale, Calif., **EARL R. HERRING** is now associated with the Pacific Airmotive Corp., a division of Airplane Mfg. & Supply Corp., Glendale, Calif.

Formerly a student member at Chrysler Institute of Engineering, Highland Park, Mich., **ABRAHAM SMAARDYK** is now technical engineer with Carbide & Carbon Chemical Co., Oak Ridge, Tenn.

LT. C. H. MARTENS, USNR, formerly at the U. S. Navy Aviation Supply Office, Philadelphia, Pa., has been transferred to a Naval Air Station in the Hawaiian area.

Formerly designing engineer, National Farm Machinery Co-operative, Inc., Shelbyville, Ind., **O. H. LOVELACE** is now connected with the sales department of Willys-Overland Motors, Inc., Toledo, Ohio.

BERTON H. DeLONG has recently been appointed a director and vice-president of the Carpenter Steel Co., Reading, Pa. Mr. DeLong was previously chief metallurgist for the company. In his new post, Mr. DeLong will continue to supervise the research and development work of the company. He has been associated with the firm since 1910, holding the position of chief metallurgist since 1916.



Berton H. DeLong

t SAE Members . . .

T. A. **BOYD,** head of the fuel department, Research Laboratories Division, General Motors Corp., has been elected vice-president of the American Society for Testing Materials to serve two years. A frequent contributor of technical papers to the SAE and other engineering society meetings, Mr. Boyd was co-discoverer with SAE Past-President **CHARLES F. KETTERING** and the late **THOMAS MIDGLEY, JR.,** of the antiknock effects of the liquid compounds of lead. He has been active on committees of the SAE, ASTM, American Chemical Society, the Coordinating Research Council, and other technical groups for years. He served as president of the Engineering Society of Detroit for the 1943-1944 term.

Formerly area automotive adviser, U. S. Army Air Forces, Robins Field, Ga., **JOE M. MILLER** is now technical assistant, vehicles branch, Air Technical Service Command, Wright Field, Dayton, Ohio.

Formerly a student member at Purdue University, Lafayette, Ind., **GEORGE A. REED** is now attending the USNR Midshipmen's School at Notre Dame, Ind.

LEONARD RAYMOND, a member of the Lubricants Division of the SAE Standards Committee, has recently been appointed assistant supervisor, Automotive Laboratory, Socony-Vacuum Oil Co., Inc., Paulsboro, N. J. Mr. Raymond was formerly associated in a similar capacity with Tide Water Associated Oil Co., Bayonne, N. J.

LT.-COL. SIDNEY G. HARRIS, Quartermaster Corps, has been appointed Area Petroleum Officer in addition to his duty assignment as Theater Petroleum Officer. His address is A.P.O. 676, c/o Postmaster, Miami, Fla. Colonel Harris is a past-chairman of SAE Metropolitan Section.

Formerly at Purdue University, West Lafayette, Ind., **STEPHEN JACK,** an apprentice seaman in the USNR, is now attending Midshipmen's School at Notre Dame, Ind.

JOHN SEAGREN is now a consulting engineer in the Diesel Division of the American Locomotive Co., Schenectady, N. Y. He was formerly development engineer on postwar products for Northern Pump Co.,

John Seagren

Minneapolis, Minn. From 1932 to 1944, Mr. Seagren was chief engineer with Atlas Imperial Diesel Engine Co., Oakland, Calif.

Julian Frey, general sales manager of Ethyl Corp., New York City, welcomes Lt.-Col. William H. Hubner. Col. Hubner is now back with Ethyl in Detroit after three years of overseas duty in the Army Air Forces. At the time of his discharge from the Army, he was deputy chief of maintenance and engineering for the Far East Air Service Command. He participated in the Papuan, New Guinea and Philippine campaigns

A. J. SCHAMEHORN, until recently deputy district chief of Army Ordnance, Rochester, N. Y., has returned to General Motors Corp. as a member of its new Technical Center engineering staff in Detroit. A graduate of the University of Michigan in 1911, Mr. Schamehorn worked as a civil engineer until joining the Hyatt Roller Bearing Co. in 1915. After a number of assignments with the corporation, he became director of the GM Proving Ground in Milford in 1929, and completed numerous executive assignments before entering the Ordnance Department, among them the assistant general managership of the Linden Division. He served in the Washington office of the corporation on the emergency staff of R. H. Grant.

A. J. Schamehorn

JOHN A. LAWLER, formerly engineer with Airesearch Mfg. Co., Los Angeles, is now powerplant engineer in the engineering department of Boeing Aircraft Co., Plant No. 2, Seattle, Wash.

Formerly a student member at the University of Colorado, Boulder, Colo., **DOUGLAS G. DENSEM** is now in the USNR, and has been assigned to the Midshipmen's School, University of Notre Dame, Notre Dame, Ind.

Formerly a student member at the Case School of Applied Science, Naval Quarters, Cleveland, **THOMAS J. BOASTFIELD,** USNR, is now attending Midshipmen's School, New York City.

EMERY B. KEREKES has severed his connection with the Kellett Aircraft Corp., Upper Darby, Pa., where he was chief test engineer. Mr. Kerekes is now associated with the Elliott Co., Jeannette, Pa., as a member of the engineering staff in the Research & Development Division.

SGT. ARNOLD SCHINDEL is now in the United States on furlough after serving overseas with the Third Army Combat Engineers. Reported missing when taken prisoner by the Germans, Sergeant Schindel was later liberated when Weiden was taken by the Third Army. Prior to entering the Army, Sergeant Schindel was research engineer with Bendix Aviation Corp.

DONALD R. HAWKINSON, USNR, has been promoted from ensign to lieutenant (jg), and may now be reached at Michigan Union, Ann Arbor, Mich.

Formerly manager of transportation, San Diego Electric Railway Co., San Diego, Calif., **PIERRE V. C. SEE** is now superintendent of equipment, Cincinnati Street Railway Co., Cincinnati, Ohio.

G. DUDLEY HARDY, a British member of the Society, has for the past five years been chief instructor at a civilian training establishment in England. His work has been concerned mainly with the technical training of driver mechanics. Mr. Hardy has been awarded the British Empire Medal in appreciation of his efforts to help win the war.

Formerly assistant chief engineer, Righter Mfg. Co., Burbank, Calif., **HAROLD KOESTER** is now chief engineer with the Leyhe Mfg. Co., same city.

JOHN E. MALONEY has recently been appointed manager of the Automotive Division of International Detrola Corp., Detroit, Mich. Mr. Maloney was formerly affiliated with the Murray Corp. of America, Ecorse, Mich.

Robert L. Abbott

V. W. Stacey

Robert L. Abbott and V. W. Stacey, who have been with General Motors Overseas Operations, Detroit, are returning to General Motors-Holden's, Ltd., of Melbourne, Australia. They have been serving with General Motors here for six and eleven months respectively

DONALD W. FAIRBAIRN has been named manager of the Detroit district of the Industrial Products Sales Division of the B. F. Goodrich Co., Akron, Ohio. Mr. Fairbairn has for the past two years been manager of the Los Angeles sales district of the same company.

R. E. COLE, vice-president in charge of engineering, Studebaker Corp., has announced formation of an operating committee to serve as top technical advisers on all engineering and research projects. Included in the committee of five are SAE members **STANWOOD W. SPARROW, H. E. CHURCHILL,** and **S. A. JEFFRIES.**

Mr. Sparrow, returning from his recent assignment as chief test engineer at the Studebaker aircraft engine plant, becomes director of research and development and will act as chairman of the operating committee in the event of Mr. Cole's absence.

Mr. Churchill becomes chief research engineer and assistant to Mr. Sparrow, while Mr. Jeffries continues as chief truck engineer.

Other members of the committee are E. M. Douglas, executive engineer for manufacturing and service, and W. W. Smith, executive engineer in charge of body design and development.

SAE members who have received recent changes in company status include: **JOHN W. HORNER,** Righter Mfg. Co., Burbank, Calif., from engineer to assistant chief engineer in charge of engineering department; **E. K. SUNDSTROM,** Atlas Aircraft Products Corp., New York City, from engineering aide to administrative engineer; **CARLTON W. BOLLER,** Pratt & Whitney Aircraft Division, United Aircraft Corp., East Hartford, Conn., from layout draftsman to designer; **ROBERT C. BARTH,** Ranger Aircraft Engines Division, Farmingdale, L. I., N. Y., from junior project engineer to project engineer; **J. A. THOMAS,** Manila Electric Co., Manila, P. I., from general superintendent to transportation manager; **H. LEDYARD TOWLE,** Pittsburgh Plate Glass Co., Pittsburgh, Pa., from director of advertising and creative design to director of color engineering, paint department; and **HAROLD A. GREENWALD,** Lockheed Aircraft Corp., Burbank, Calif., from research engineer to senior research engineer.

ELVIS E. JONES, lubrication engineer, Union Oil Co. of Calif., Los Angeles, was interned in the Philippines for 39 months. Applying for SAE membership following his liberation and return to the United States, Mr. Jones sends the interesting information that "we used the *SAE Journal* for school work while interned in the Philippines for 39 months by the Japanese Army."

CHARLES F. FOELL, former vice-chairman and secretary of SAE Metropolitan Section, has severed his connection with *Diesel Power* and *Diesel Transportation,* as editor. Mr. Foell is now affiliated with Socony-Vacuum Oil Co., Inc., New York City, where he will be in the technical division of the Industrial Lubrication Department.

Charles F. Foell

MAURICE OLLEY is back with General Motors Corp. – this time as a member of the Overseas Operations Division. Before the war, he was an important member of the engineering department at GM's Cadillac Division for many years, and later was passenger vehicle engineer of the corporation's British subsidiary, Vauxhall Motors, Ltd. Mr. Olley spent part of the war years with Rolls-Royce, Ltd., and more recently was consulting engineer to the British Army Staff in Detroit. Mr. Olley is located in Room 4-233, General Motors Building, Detroit.

M. BEN HEFTLER recently joined the staff of Evans Products Co., Detroit, as project engineer. Mr. Heftler was previously mechanical engineer with Kellex Corp., New York City.

A. L. BOEGEHOLD, head of the metallurgy department, General Motors Corp., Research Laboratories Division, Detroit, has been elected vice-president of the American Society for Metals. Mr. Boegehold has been very active in the Iron and Steel Division of the SAE Standards Committee.

Previously in the London, England, branch of the Ford Motor Co. of Canada, Ltd., Office of Technical & Spares Representatives, **M. P. PAUPST** is now serving in the service department of the same company in Windsor, Ont., Canada.

ERNEST G. WHITNEY, who had been assistant executive engineer, National Advisory Committee for Aeronautics, Cleveland, is now assistant chief engineer, Ranger Aircraft Engines Division, Fairchild Engine & Airplane Corp., Farmingdale, L. I., N. Y.

R. K. ALLAN, chief draftsman, Skefko Ball Bearing Co., Ltd., Luton, England, has compiled a comprehensive and detailed work, "Rolling Bearings," which covers every aspect of the theory and practice of ball and roller bearings. The work of Hertz, Stribeck, and others is set forth, along with many formulas which are arranged in a suitable and convenient way for practical use. Relative movement, resolution of forces, typical design and details, and matters relating to use, maintenance, and repair are only some of the many general topics covered. The book, published by Sir Isaac Pitman & Sons, Ltd., London, England, is an invaluable guide for designers, draftsmen, plant and maintenance engineers, students, and others interested in this important – and often neglected – branch of engineering.

Cole Names Operating Committee

Three other SAE members are included in this engineering operating committee recently appointed by Vice-President in Charge of Engineering R. E. COLE at Studebaker.

Left to right: W. W. Smith, executive engineer in charge of body design and development; S. A. JEFFRIES, chief truck engineer; R. E. COLE; H. E. CHURCHILL, chief research engineer; STANWOOD W. SPARROW, director of research and development, and E. M. Douglas, executive engineer for manufacturing and service

ROBERT W. CHRYSLER is now plant manager of the Bragg Bronze & Aluminum Foundry Co., Cleveland. He was formerly chief inspector with the National Bronze & Aluminum Foundry Co., Cleveland.

Formerly technical adviser, U. S. Army, CAF-9, Service Division, Post Ordnance, Camp Breckenridge, Ky., JOHN TAAFFE is now principal automotive adviser, 69th Engine Training Battalion, 13th Group, Fort Lewis, Washington.

WALLACE J. SQUIRE, who had been general sales manager, Eclipse Machine Division, Bendix Aviation Corp., Elmira, N. Y., is now assistant to the president of the U. S. Time Corp., Waterbury, Conn.

Formerly at Fort Belvoir, Va., HENRY W. COOPER, a staff sergeant in the U. S. Army, may now be reached at the Replacement Depot at Camp Beale, Calif.

Formerly a student member at Purdue University, West Lafayette, Ind., P. R. JOHNSON is now in the USNR, and is stationed at the Midshipmen's School, Notre Dame, Ind.

RICHARD B. MILLER, who had been field engineer, Wright Aeronautical Corp., Baltimore, Md., is now installation engineer in the Paterson, N. J., branch of the same company.

Formerly at Luke Field, Phoenix, Ariz., ROLAND ROGERS, U. S. Army, has been promoted from second to first lieutenant and may now be reached at the Base Weather Station, Muroc Army Air Field, Muroc, Calif.

Previously head of the industrial vocational department, Frankfort Community High School, West Frankfort, Ill., JOHN H. PIKUS is now an instructor in auto- and aircraft-engine mechanics at Belleville Township High School, Belleville, Ill.

Previously a student member at Purdue University, West Lafayette, Ind., CHARLES A. GILLESPIE is now in the USNR, and is stationed at the Midshipmen's School at Notre Dame, Ind.

PVT. BRUCE B. BUNTING, U. S. Army, is now in the Corps of Engineers, and is stationed at Fort Belvoir, Va. Before entering the Army, Private Bunting was production engineer, Bunting Brass & Bronze Co., Toledo, Ohio.

G. C. COLLINS, Thompson Products, Inc., is now service field engineer with headquarters in Cleveland. Mr. Collins was previously district manager for 15 years of the Seattle, Wash., branch of the same company.

LT.-COL. PETER de PAOLO, U. S. Army, nationally famed auto racing driver, has returned from a year's duty with the American armed forces overseas. For outstanding service while in the Army, Colonel de Paolo has been awarded the Legion of Merit. He will retire shortly from the Army and will be associated with the Hastings Mfg. Co., Hastings, Mich.

PAUL FULLER, who had been connected with Fitzjohn Coach Co., Muskegon, Mich., as chief engineer, is now project engineer with Continental Motors Corp., same city. Mr. Fuller is secretary of SAE Western Michigan Section.

Weatherhead Appointments

Appointment of J. F. Campbell (right) as chief development engineer and R. W. Phillips (left) as laboratory director of the Weatherhead Co., Cleveland, was announced recently. In his new position, Mr. Campbell will conduct the Weatherhead development program. He came to the company early this year from the Holley Carburetor Co. Mr. Phillips, whose new duties will entail direct operation of the entire Weatherhead laboratory, joined the firm in 1941

R. W. Phillips J. F. Campbell

ROBERT L. HARTLEY, who had formerly been experimental engineer, Fuel Injection Division, Bulova Watch Co., Woodside, L. I., N. Y., is now special designer for Taft-Peirce Mfg. Co., Woonsocket, R. I.

HOMER W. HARD has joined the technical staff of Wilkening Mfg. Co., Philadelphia, to assist in the production of technical service literature, instruction manuals and other technical data on Pedrick piston rings.

Homer W. Hard

For the past three years, Mr. Hard had been engaged in training and instruction work for the Air Service Command. Prior to that, for 16 years, he was with the Studebaker Corp. in research and development engineering, in production inspection, and as service manager.

Formerly engineer, General Motors Corp., Detroit, HENRY O. FUCHS is now associated with Preco, Inc., Los Angeles, Calif.

Among new officers of the Rackham Engineering Foundation elected March 23 were the following SAE members: HENRY FORD II, who had served previously as vice-president, was elected president of the organization; JOHN H. HUNT, treasurer; and WILLIAM S. KNUDSEN, trustee.

PAUL DUBOSCLARD, who had formerly been president of Paragon Research, Inc., Buffalo, N. Y., is now chief engineer with the Farnham Mfg. Co., same city.

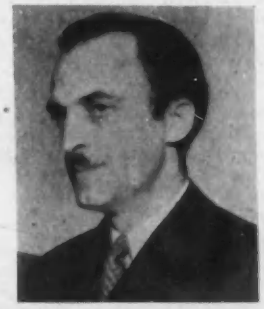
RICHARD W. BORGERS, USNR, is now at the Naval Training and Distribution Center, Shoemaker, Calif. He was previously stationed at the Navy Pier, Chicago, Ill.

Formerly Ordnance Department, Post Motor Repair Shop, Fort Bragg, N. C., CAPT. LESTER C. ROIG is now at the Supply Division, Reclamation Center, Fort Jackson, S. C.

LT.-COL. W. LOCKWOOD MARSH, editor of *Aircraft Engineering*, has, in his book, "The ABC of Flying," published by Pheiades Books, Ltd., London, England, explained in simple language exactly how an airplane flies and is controlled. Complexities such as "two-stage, two-speed" superchargers and "constant-speed, fully-feathering" propellers are made clear to the air layman. A thorough explanation of the newly developed jet-propulsion system makes it completely up-to-date. A special feature of the enlightening book is a series of photographs of the airflow around streamline bodies and over wings which makes visible the behavior of the air in various conditions.

JOHN L. COLTMAN, who had formerly been manager, furnace brazing, John Marston, Ltd., Wolverhampton, England, is now associated with the Grantham Boiler & Crank Co., Ltd., Grantham, Lincs, England.

TED E. ALLEN, formerly secretary of the contest board and manager of the car service department of the American Automobile Association, Washington, D. C., left that organization to become commissioner of the Brake Lining Manufacturers Association, New York City. While he was with the



Ted E. Allen

AAA, Mr. Allen conducted the nation-wide "Keep 'Em Rolling" tour, during which conservation of cars, tires, batteries and spare parts was preached to the motoring public.

J. L. Goldthwaite (left) has recently been made technical consultant to the chief metallurgist of Allison Division, General Motors Corp. He was formerly assistant production engineer. W. C. Oestrike, who was with the general engineering department of Allison Division, General Motors Corp., has been promoted to the position of assistant production engineer

MARSHALL G. REID, who had been in the mechanical goods development department, Goodyear Tire & Rubber Co., Wabash, Ind., is now head of the silent-bloc design department, Mechanical Goods Division, General Tire & Rubber Co., same city.

WILLIAM GARBER, an apprentice seaman in the USNR, is now stationed at the Midshipmen's School, Columbia University, New York City. He was formerly assigned to Purdue University, West LaFayette, Ind.

Formerly research engineer, Shell Oil Co., Inc., Wood River, Ill., **WILLIAM S. WILSON** is now associated with the Socony-Vacuum Oil Co., Inc., Technical Service Division, Brooklyn, N. Y., in an engineering capacity.

Previously affiliated with the McCulloch Aviation Co., Milwaukee, Wis., **ELLSWORTH D. WILKIN** is now assistant chief engineer with Salsbury Motors Division, Avion, Inc., Los Angeles, Calif.

HANS RUTISHAUSER has recently been appointed executive vice-president of Combustion Research Co., Los Angeles, Calif. The company specializes in the production of jet propulsion motors.

Formerly a student member at Purdue University, West Lafayette, Ind., **HERBERT PHILLIPS,** an apprentice seaman in the U. S. Navy, is now stationed at the University of Notre Dame.

D. M. BROWN, formerly with the Engine Research Laboratory of the Armour Research Foundation, is now assigned to a U. S. Army petroleum unit in the China-Burma-India Theater.

Formerly senior project engineer, aircraft section, Fisher Body Division, General Motors Corp., Detroit, **MILLARD M. HENRY** is now development engineer with Eclipse Machine Division, Bendix Aviation Corp., Elmira, N. Y.

Previously powerplant design engineer, Republic Aviation Corp., Farmingdale, L. I., N. Y., **MARCUS C. BENEDICT** is now section engineer in charge of installation, Westinghouse Electric Corp., Essington, Pa.

Previously superintendent, sub-contract department, Hinckley-Myers Division, Kent-Moore Organization, Jackson, Mich., **PAUL J. DOOLEY** is now associated with the Auto-Marine Mfg. Co., Toledo, Ohio.

Formerly service engineer, Consolidated Vultee Aircraft Corp., San Diego, Calif., **JOHN E. CREGIER, JR.,** is now affiliated with Commonwealth Aircraft, Inc., Plant No. 1, Kansas City, Kan., as project engineer in charge of special engineering projects, and assistant to the chief engineer.

Formerly technical representative, technical representatives section, U. S. Army, Headquarters, Air Service Command, A.P.O. 633, c/o Postmaster, New York City, **J. R. ORGAIN, JR.,** is now associated with Chandler-Evans Corp., South Meriden, Conn., in the field engineering department.

THOMAS B. DOE, JR., has been appointed manager of the aircraft equipment sales division of Vickers, Inc. He has been associated with the engineering research and development of Vickers' equipment for aircraft. Just prior to his new assignment he was field engineer in the East on the application of Vickers' hydraulic aircraft equipment to many combat and transport aircraft.

THEODORE G. COYLE has become vice-president of United Chromium, Inc., Detroit. Mr. Coyle, well known in the electroplating and metal finishing field, will also retain his duties as technical director of the company. He has been with the firm since its inception.

When notifying the SAE of a change of address, **CAPT. WILLIAM C. IRVING,** U. S. Army, sent along from somewhere in Germany a Nazi armband as a souvenir of the Germans. Captain Irving's new address is U. S. Strategic Bomb Survey, A.P.O. 413, c/o Postmaster, New York City.

ROBERT L. LaCHAPELLE, a lieutenant in the USNR, has been transferred from the Bureau of Ships, Diesel Engine Section, Washington, D. C., to Ships Parts Control Center, Harrisburg, Pa., where he is factory liaison officer.

Formerly manager, commercial department, Webster-Brinkley Co., Seattle, Wash., **ELLIOTT B. HIGGINS,** a lieutenant (jg) in the USNR, may now be reached at the Office of Inspector of Naval Material, Navy Department, Atlanta, Ga.

Formerly vice-president and general manager, Allied Refiners Corp., Idaho Falls, Idaho, **W. C. LAWLER** is now president and general manager of Allied Products Corp., Salt Lake City, Utah.

JOSEPH S. PECKER, who had been president and owner of the Machine & Tool Designing Co. of N. Y., New York City, is now a consulting engineer with private offices in Los Angeles, Calif.

WALTER G. AUER, who had been manager of the Portland branch of the White Motor Co., Portland, Ore., is now wholesale manager with the company with offices in the San Francisco, Calif., branch of the company. Mr. Auer is treasurer of SAE Oregon Section.

Formerly hydraulic engineer, Federal Machine & Welder Co., Warren, Ohio, **BURNELL O. BURRITT** is now development engineer with Craftsman Tool & Die Co., Detroit.

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OBITUARIES

Stephen G. Maco

Stephen G. Maco, metallurgist with Timken-Detroit Axle Co., Detroit, died recently at the age of 27. As metallurgist with the Timken organization, Mr. Maco had to contact outside suppliers on metallurgical problems and maintain quality control on material received from them. He specialized in the metallurgy of iron and steel. As a student engineer with the National Tube Co., Lorain, Ohio, in 1941, he was engaged in metallurgical projects in bessemer furnace practice, open hearth furnaces, rolling mills, and other iron and steel practices.

Mr. Maco received a B.S. in metallurgical engineering from Lehigh University in 1941.

William G. Forbes

William G. Forbes, lubrication engineer with Tidewater Associated Oil Co., New York City, drowned Sunday, July 29, while swimming at Jones Beach. Mr. Forbes was 50 years of age.

Born in Helensburgh, Scotland, Mr. Forbes was graduated from the University of Mechanical Engineers, London, England, in 1925. He came to the United States after World War I, where he shortly became affiliated with Socony-Vacuum Oil Co., Inc., New York City, as staff engineer.

Mr. Forbes was the author of "Lubrication of Industrial and Marine Machinery" and of many articles for magazines.

Harold W. J. Bent

Harold W. J. Bent, who had been in charge of hulls, turrets & gun mountings, Vickers-Armstrongs, Ltd., Surrey, England, died June 27 at the age of 43.

Mr. Bent started his engineering career as a draftsman in 1922 at Vickers, Ltd., England, where he worked on field gun carriages, armored cars, tanks, and other military equipment. In 1929, he was associated with Roadless Traction, Ltd., where he worked on agricultural tractors and implements. He became a designer in 1930, and since that time had helped to develop many types of tanks, incorporating new improvements.

Mr. Bent had been a foreign member of the SAE since 1943.

Harold H. Barnes

Harold H. Barnes, design engineer, Lockheed Aircraft Corp., Burbank, Calif., died June 25. Mr. Barnes was 51 years of age.

Mr. Barnes' work covered a great part of the field of engineering. Starting in 1910 as a mechanic with McCready Machine Co., Parkeley, Va., he gained valuable experience through the years as field engineer, supervisor, assistant works engineer, maintenance engineer and many other engineering positions. Mr. Barnes joined the Society in 1924.

1945-1946 SECTION CHAIRMEN

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R. D. Speas
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Arch L. Foster
Mid-Continent

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Russell T. Howe
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Western Michigan

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Edward F. Harrison
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Mo.-Hud. Group

Leonard J. Love
Salt Lake Group

D. E. Hult
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SAE SECTION

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Chicago

Chairman: **Emil O. Wirth,** chief engineer, military and light aircraft carburetor department, Bendix Products Division, Bendix Aviation Corp.; vice-chairman: **William H. Oldacre,** president, general manager, D. A. Stuart Oil Co., Ltd.; vice-chairman, Aeronautics: **J. E. Kline,** chief model test engineer, Dodge Chicago Plant, Chrysler Corp.; vice-chairman, Fuels & Lubricants: **M. D. Gjerde,** manager, sales technical service department, Standard Oil Co. of Ind.; vice-chairman, Parts & Accessories: **R. H. Brouck,** national fleet account representative, E. I. du Pont de Nemours & Co., Inc.; vice-chairman, Passenger Cars: **H. E. Churchill,** assistant research engineer, Studebaker Corp.; vice-chairman, Tractor & Diesel Engines: **Raymon Bowers,** development engineer, International Harvester Co.; vice-chairman, Transportation & Maintenance and Truck & Bus: **George C. Stevens,** branch manager, Diamond T Motor Car Co.; vice-chairman, Transportation & Maintenance: **Orville A. Brouer,** Swift and Co.; treasurer: **H. S. Manwaring,** engineer, International Harvester Co.; secretary: **W. W. Davies,** superintendent, research, United Airlines, Inc.

Cincinnati

Chairman: **Russell T. Howe,** assistant plant manager, Wright Aeronautical Corp., Cincinnati Division; vice-chairman: **Wilburn E. Meyer,** supervisor of equipment, highway maintenance, Department of Public Works, City of Cincinnati; treasurer: **A. G. W. Brown,** transportation engineer, assistant treasurer, Schenley Distilleries Motor Division, Inc.; secretary: **William A. Kimsey,** engineer, R. K. LeBlond Machine Tool Co.

Cleveland

Chairman: **Roger L. Weider,** executive engineer, Coach Division, White Motor Co.; vice-chairman: **John R. Cox,** managing partner, Balas Collet Mfg. Co.; vice-chairman, Aeronautics: **George M. Walton,** vice-president, Air-Maze Corp.; vice-chairman, Akron-Canton District: **Walter E. Lyon,** manager, tire development department, Firestone Tire & Rubber Co.; vice-chairman, Transportation & Maintenance: **William G. Piwonka,** superintendent of equipment, Cleveland Transit System; vice-chairman, Truck & Bus: **B. Frank Jones,** assistant chief engineer, charge of engineering, U. S. Army Vehicles, White Motor Co.; treasurer: **Robert Cass,** assistant to president, White Motor Co.; secretary: **Norman Hoertz,** service engineer, Thompson Products, Inc.

Dayton

Chairman: **Col. Clyde H. Mitchell,** chief, aircraft sub-section, U. S. Army Air Forces, Headquarters, Air Technical Service Command; vice-chairman, Columbus District: **Charles P. Roberts,** assistant professor of mechanical engineering, Ohio State University; vice-chairman, Dayton District: **T. R. Dinsmore,** chief engineer, Curtis Engineering Co.; vice-chairman, Springfield District: **Harvey W. Hanners,** assistant research engineer, Superior Engine Division, National Supply Co.; treasurer: **Ervin A. Lauch,** design engineer, Superior Engine Division, National Supply Co.; secretary: **George W. Heck,** research engineer, United Aircraft Products, Inc.

Detroit

Chairman: **Ronald J. Waterbury,** body engineer, Chevrolet-Central Office; vice-chairman: **Vincent C. Young,** chief engineer, Wilcox-Rich Division, Eaton Mfg. Co.; vice-chairman, Aeronautics: **Robert Insley,** vice-president, engineering, Continental Motors Corp.; vice-chairman, Junior Student Activity: **Paul Huber,** assistant director, General Motors Proving Ground; vice-chairman, Passenger Cars: **John J. Wharam,** assistant chief engineer, Lincoln Motor Division, Ford Motor Co.; vice-chairman, Passenger-Car Body: **J. W. Greig,** chief engineer, Woodall Industries, Inc.; vice-chairman, Production: **L. Irving Woolson,** factory manager, Chrysler Corp., De Soto Division; vice-chairman, Regional: **R. P. Lewis,** chief engineer, Railway & Axle Division, Spicer Mfg. Corp.; vice-chairman, Truck & Bus: **E. P. Lamb,** chief engineer, Engineering Division, Chrysler Corp.; treasurer: **F. W. Marschner,** western sales manager, New Departure Division, General Motors Corp.; secretary: **Frank S. Spring,** Hudson Motor Car Co.

Hawaiian

Chairman: **L. A. McDonell,** superintendent of equipment; Honolulu Construction & Draying Co., Ltd.; vice-chairman: **Ira K. Black,** superintendent, automotive equipment, Honolulu Rapid Transit Co., Ltd.; treasurer: **Malcolm H. Love,** Shell Oil Co., Inc., secretary: **W. J. Maze,** engineer C. Brewer & Co., Ltd.

Indiana

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Kansas City

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SAE Coming Events

Chicago – Sept. 14 and 17

Sept. 14 – Westward Ho Country Club; dinner 7:00 pm. Annual Golf Party.

Sept. 17 – LaSalle Hotel, South Bend; dinner 6:30 p.m. Eddy Current Dynamometers – Clutches – and Their Electronic Control Devices – Martin P. Winther, vice-president, Dynamic Corp.

Cleveland – Sept. 10.

Thompson Aircraft Products Co., Euclid; dinner 6:30 p.m. More Power to Engineering – James C. Zeder, chairman of engineering, Chrysler Corp.

Dayton – Sept. 26

Van Cleve Hotel; dinner 6:45 p.m. Atomic Energy. Speaker to be announced. Motion picture.

Kansas City – Sept. 11

Continental Hotel; dinner 6:30 p.m. Experiences in the South Pacific as Executive Officer on Intrepid – Captain R. P. Kauffman, United States Naval Air Station.

Metropolitan – Sept. 6

Pennsylvania Hotel, New York; meeting 8:00 p.m. Symposium on Brakes. Papers presented by Wagner Electric Brake Co., Bendix Aviation Co., Lambert Brake Co. Display on various types of brakes.

Milwaukee – Sept. 13 and 14

Sept. 13 – Schroeder Hotel; Rubber Tracks for Agriculture – C. O. Slemmons, B. F. Goodrich Co. Prepared discussion by: G. L. Zink, Firestone Tire & Rubber Co., E. F. Brunner, Goodyear Tire & Rubber Co., L. C. Daniels, Oliver Corp. Induction Hardening as Applied to Farm Machinery – F. F. Vaughn, Caterpillar Tractor Co. Prepared discussion by: Frank Sailer Tractor Works, International Harvester Co., R. E. McGee, International Harvester Co., H. Bornstein, Deere & Co., John T. Jarman, Allis-Chalmers Mfg. Co. Dinner session – Hydraulics as Applied to Tractors and Farm Machinery – L. R. Twyman, Vickers, Inc.

Sept. 14 – Merrill Hills Country Club, Waukesha; dinner 7:00 p.m. Annual Golf Tournament.

Northern California – Sept. 7

Palace Hotel, San Francisco; morning and afternon technical sessions. Engineers Club, San Francisco; dinner and evening session. Subjects: Postwar Engine Design. Ordnance Design and Maintenance Problems. How Lubrication Man Would Design an Engine. Design Requirements of Industry. Speakers to be announced.

Northwest – Sept. 15

Edmond Meany Hotel, Seattle; Valve and Valve Inserts, Heavy Equipment – Vincent C. Young, chief engineer, Wilcox-Rich Division, Eaton Mfg. Co. Technical discussions held by G. D. Barnes. Postwar Maintenance – Earl B. Richardson, superintendent of equipment, Portland Tractor Co. Technical discussions by Hill Hubka. Field Performance Synthetic Truck Tires – R. A. Blake, general service manager, U. S. Rubber Co. Technical discussions by Harley Drake. Dinner 7:00 p.m. Bearings – R. A. Watson, in charge of engineering and sales, Western Division, Federal Mogul Corp. Technical discussions by W. W. Churchill.

Southern California – Oct. 4

Biltmore Hotel, Los Angeles. Symposium on High Strength Aluminum Alloys: Shop Aspects of the New High – Strength Aluminum Alloys – Roy A. Miller and Max E. Tatman, Consolidated Vultee Aircraft Corp. Utilization of New High Strength Aluminum Alloys – J. F. McBrearty, Lockheed Aircraft Corp. Thirty minute question and answer forum conducted by M. E. Tatman, J. F. McBrearty, L. P. Spalding and H. M. Harrison. Symposium on Refueling: Operator's Viewpoint – Russell Secrest, Pan American Airways. Some Aspects of Under-Wing or Pressure Refueling – C. S. Brandt and W. C. Wold, Consolidated Vultee Aircraft Corp. Fuel Refiner's Viewpoint – Joseph E. Knight, Intava, Inc. Equipment Manufacturer's Viewpoint – A. O. Payne, Ohio Pattern Works and Foundry Co. Symposium – Weight Reduction of Aircraft Braking Systems Through the Use of Reverse Thrust Propellers: Test Run Data on a B-32 – Wendell Eldred, Consolidated Vultee Aircraft Corp. Propellers – H. H. Warden, Curtiss-Wright Corp., Propeller Division. Wheel Brakes – H. H. Kerr, Hayes Industries, Inc. Discussion by E. K. Lasswell, ATSC, Wright Field. Aircraft Powerplant Session: Factors in Aeration and Deaeration of Engine Oils – W. L. Weeks, Wright Aeronautical Corp., S-8 System of Lubrication for Aircraft Engines – Prof. P. H. Schweitzer, Pennsylvania State College, and L. P. Sharples, Sharples Corp. Aircraft Powerplant Session: Effect of Engine Exhaust Pressure on the Performance of Compressor-Engine-Turbine Units – Prof. C. F. Taylor, Massachusetts Institute of Technology. Aviation Gas Turbine Installation Problems – M. C. Benedict, Aviation Gas Turbine Division, Westinghouse Electric Corp. The Place of the Gas Turbine in Aviation – C. D. Flagle and F. W. Godsey, Jr., Westinghouse Electric Corp.

Spokane Group – Sept. 21

Spokane Hotel; dinner 7:00 p.m. Flight Safety – Louis P. Johnson, motor transportation superintendent, U. S. Army Air Corps, Spokane Army Air Depot.

Survey Shows Increase in Post-War Private Flying

by RAY ROBINSON
Crowell-Collier Publishing Co.

■ Detroit, May 7

(Excerpts from paper entitled "The Postwar Market for Personal Planes")

IN an effort to ascertain the attitude of the public toward the ownership of personal airplanes, we called upon a representative cross-section of the logical aviation market of the future – urban families of better-than-average incomes. Supplementing this consumer survey with a survey of the opinions of Army and Navy pilots, we found the results to show that there are four outstanding factors which will make the post-war aviation market an active one.

First, we have the know-how to produce lightweight planes for private ownership which will attract many more buyers than the aircraft industry has ever seen before. These planes will stress safety, ease of handling, and economy.

Second, there will be increased civic interest in airport development, because all alert communities will see the need of good local airports, just as communities during the last few generations grasped the need for good roads. One aircraft company is circulating booklets among the communities of the country to educate them to this need.

Third, a large body of skilled pilots and technicians have been developed in this war, most of whom seem anxious to continue their aviation activities after the war. These men will supply the nucleus for a great personal aircraft distributing organization – with distributors and dealers throughout the country able to demonstrate and teach people to fly personal planes and able to sell the utility of fast intercity air transportation.

Fourth, we have learned how to merchandise and sell and advertise airplanes through our experience with automobiles and other high-priced articles. The desire for private flying and personal aircraft is already created, but we need advertising to stimulate it – to educate the public to both the pleasure and utility of private flying. When these have been demonstrated along with safety, the market for personal planes will be assured.

Giant Convair Has New Design Features

by R. R. HOOVER
Consolidated Vultee Aircraft Corp.

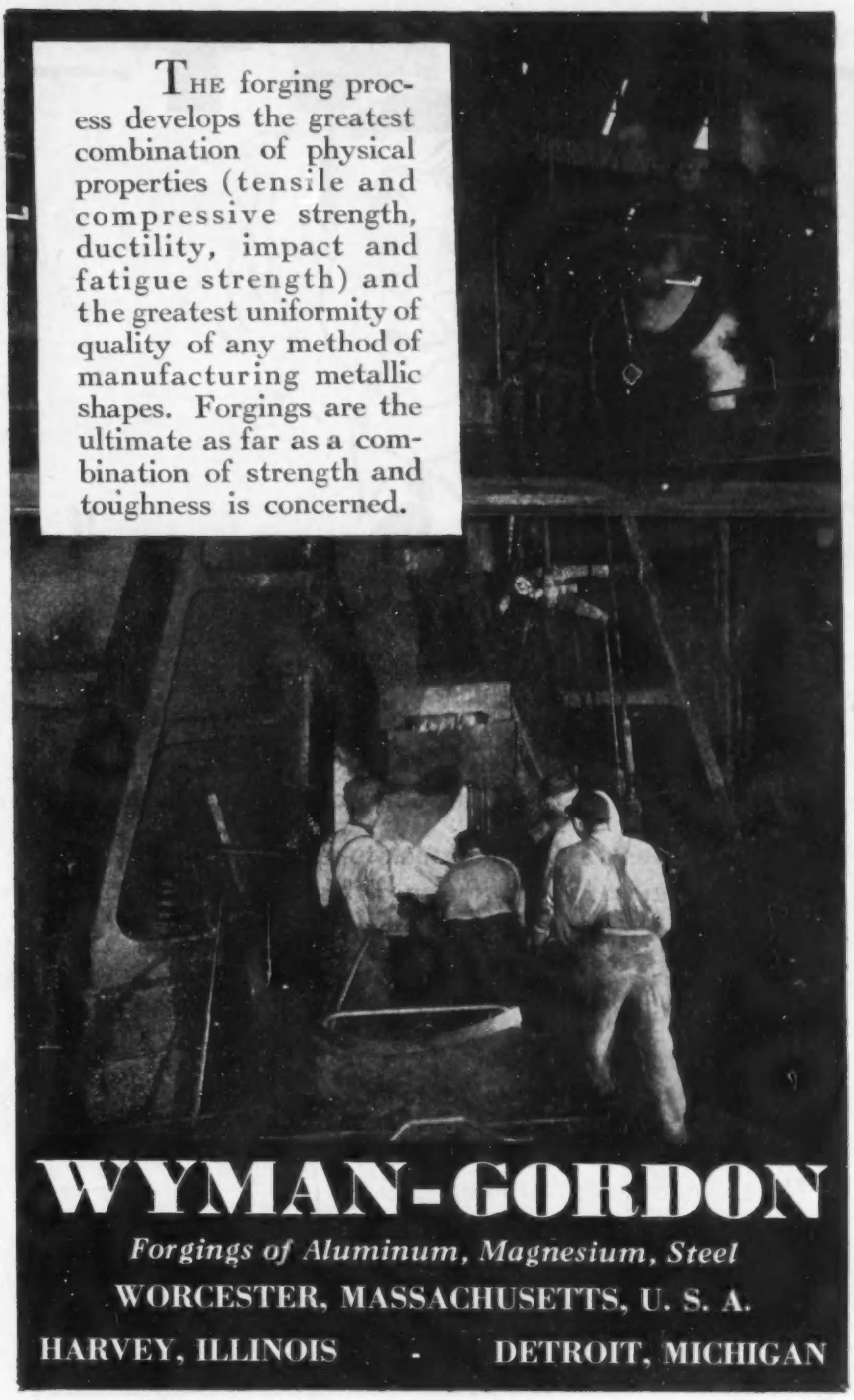
■ Texas, May 25

(Excerpts from paper entitled "The Design and Development of Large Post-War Transport Aircraft")

THE weight of the completed Convair airplane – less fuel, oil, personnel, and so forth, commonly known as weight empty, will be about 165,000 lb – 82½ tons! The design gross weight is 320,000 lb! But despite this weight, the power loading, with its four 5000 hp engines, is only approximately 19.7 lb per hp. This is about 1 lb per hp less than the Liberator bomber. Loaded to its design gross weight, which includes a payload of 50,000 lb – passengers, mail and express – it weighs 320,000 lb, or 160 tons. This includes sufficient fuel to fly from New York to London with allowance for a 50 mile headwind and with additional reserve for an alternate landing field.

Up to a few years ago, the best material for the airframe was roll hardened aluminum alloy, commonly designated as 24 S-T. Recently it was discovered that the properties of this material could be improved markedly by subjecting it to a controlled heat for a period of time, known as the "aging cycle." This, combined with varying degrees of "cold work," produces several higher strength 24 S-T conditions, known as T80, T81, T84 and T86, in the order of their respective properties. It has been estimated that over 6600 lb were saved in the Model 37 by their use. These, in combination with new alloys of aluminum and of magnesium, permitted the structural designer to use lighter gages of higher strength materials, their application being restricted only by manufacturing limitations such as severe forming, dimpling, and so forth. Also, high grade steels, castings and forgings were made available – all contributing to structural strength at less weight than was previously attainable.

In addition, a greater effort has been made to hold the design margins to a prac-


THE forging process develops the greatest combination of physical properties (tensile and compressive strength, ductility, impact and fatigue strength) and the greatest uniformity of quality of any method of manufacturing metallic shapes. Forgings are the ultimate as far as a combination of strength and toughness is concerned.
WYMAN-GORDON
Forgings of Aluminum, Magnesium, Steel
WORCESTER, MASSACHUSETTS, U. S. A.
HARVEY, ILLINOIS - DETROIT, MICHIGAN

tical minimum, frequently little more than 2 to 5%.

The wings, tail and fuselage of the airplane are of conventional construction, utilizing metal skin over metal stringers and bulkheads. But not all materials used are this gage. In fact, it should be noted that the lower surface plating of the wing varies in thickness to a maximum of ⅜ in. All exterior surfaces are attached with flush rivets in order to keep the air resistance, or drag, to a minimum.

The powerplants, which develop 5000 hp each, are of a new type utilizing low grade fuel. The propellers are 16 ft diameter, counter-rotating, three bladed and are arranged to push rather than pull the airplane through the air. Since this airplane utilizes a laminar flow airfoil wing, the pusher installation was used to obtain an uninterrupted wing leading edge thus assuring full utilization of the low-drag characteristics of the airfoil.

The fuel is carried in tanks built integral with the wing structure and sealed against leakage by the use of rubber-like neoprene between all overlapping members and plating. There is no fuel tank closer than approximately 6 ft from the fuselage, thus eliminating any possible contamination of the passenger compartments with odors of fuel vapor.

The landing gear also is conventional in appearance and construction, though its size is tremendous.

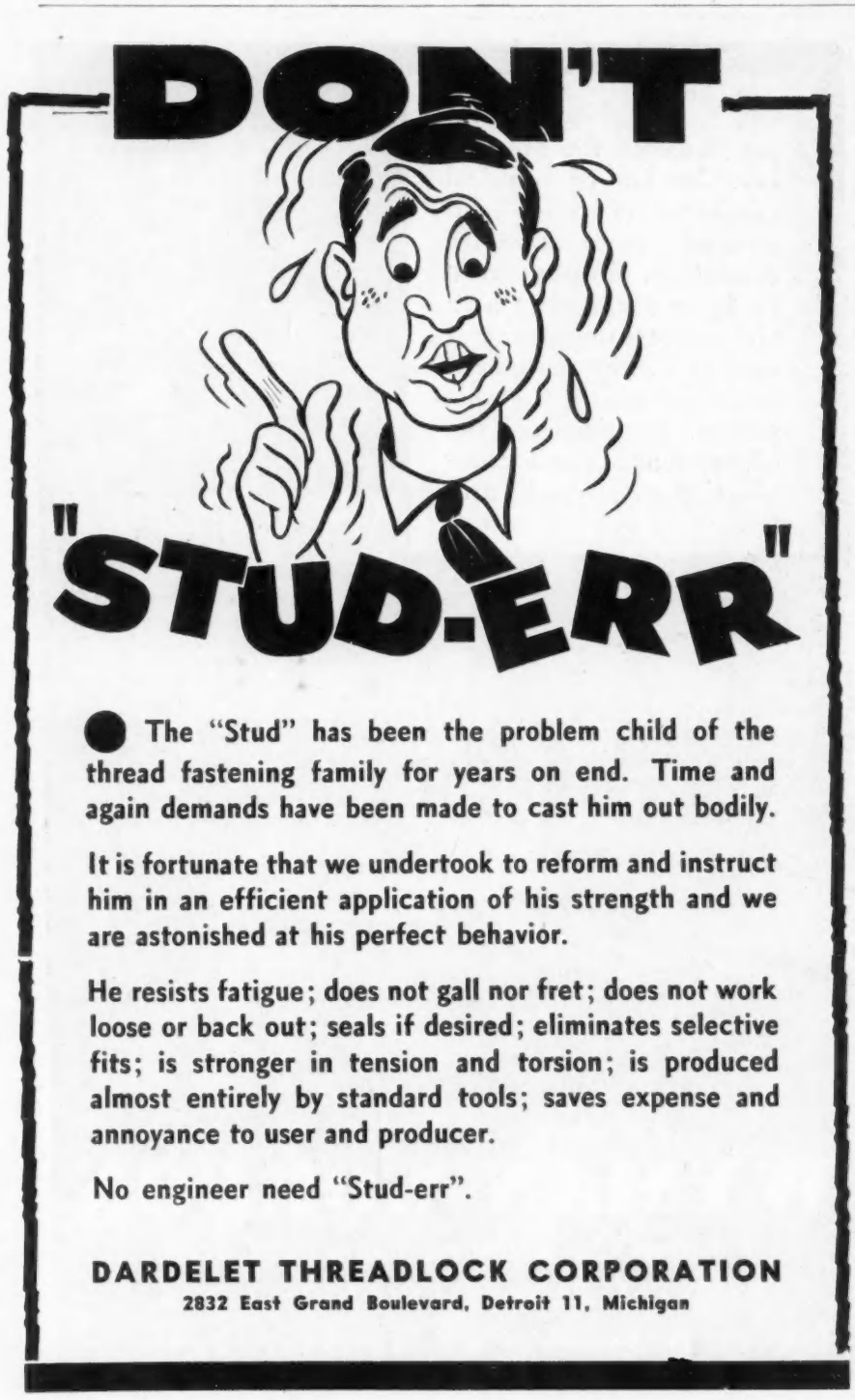
The nose wheels are steerable from the pilot stations, using hydraulic power for their actuation. The main wheels are provided with improved hydraulic brakes which apply a braking force of 82,500 lb with the application of 140 lb at the pilot brake pedals, which means toe control for an airplane weighing 160 tons.

While the cockpit control elements, wheel and rudder pedals, are conventional, the control surfaces are not. To reduce the high airloads on the large control surfaces to small pilot forces comparable to current airplanes, such as the Liberator, it was necessary to incorporate a comparatively ... principle, known as servo tab boost.

The ailerons, though controlled in the conventional manner, are comparatively small in area and are not used as the sole means for lateral control of the airplane. These ailerons are called guide or feel ailerons, for their primary function is to provide the pilot with normal "feel," while the greater part of the lateral control is achieved by "spoilers" with which the guide ailerons are connected. The spoilers are essentially flat metal plates recessed below the wing surface in slots extending inward from the wing tips some 40 ft and normally parallel to the rear edge of the wing. These plates are arranged so that coincident with the upward motion of the adjacent guide aileron, they will extend upward, edgewise, in amounts varying with the degree of movement of the guide aileron. The spoiler on the opposite wing tip remains recessed in the wing. The projection of the spoiler above the wing surface disturbs the airflow over that wingtip, thus reducing the lift as compared to the opposite wingtip, and the airplane is banked in the desired direction. The spoilers are so arranged that their operation imposes no load on the control wheel, and since they alone give no pilot "feel" they are complemented with the guide aileron which, as stated before, serves this purpose. An advantage of the spoilers feel aileron system is the fact that nearly the of the wing trailing edge may be utilized for wing flaps.

The electrical system power is basically 220 v, 400 cycle, three phase, a-c, and is supplied by three 50 kw alternators. Such direct current and/or lower voltage power as is required is furnished by motor generators or transformer rectifiers operating from the basic power. The 150 kw capacity of the alternators is sufficient to provide 100% standby for all normal electrical power requirements and 200% standby for the power essential to the flight of the airplane. The power distribution system consists of some 25 miles of wire strung about the airplane as required for the various motors, actuators, radios, lighting systems and so forth. Circuits are elaborately protected by fuse and circuit breakers. These are located in junction boxes and panels arranged for ready access in flight or on the ground.

The use of hydraulic power in the Model 37 has been confined to only four major operations: extension and retraction of the main landing gears, actuation of main wheel brakes, extension and retraction of the nose landing gear, and nose wheel steering. It should be noted that the first two functions apply to each of the main landing gears and the latter two to the nose landing gear. Hydraulic power is provided by "package" units, each consisting of an electric motor



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Due to their light weight, it has been pos...le to install duplicate units for each hy...aulic function, thus providing 100% ...ndby, and at less than the weight of the ...nventional central system with its exten...e and sometimes troublesome plumbing. ...kage units also simplify the maintenance ...oblem since they may easily be replaced ...th new or serviced units at predetermined ...ervals, thus minimizing the possibility of ...lure in service. Control of these units is ...ovided electrically from the pilot's com...rtment through the use of solenoid valves ...ated at each unit.

The entire fuselage, excepting only a ...all recess built over the nose landing gear ...d that portion behind the tail, is pres...rized to provide a pressure altitude of ...00 ft while the airplane flies at an alti...de of 25,000 ft.

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This huge airplane has payload of 43,000 ... with fuel for a range of 4200 miles at ...titude of 25,000 ft at an average speed of ...er 340 mph.

...ircraft Conversion Calls ...r Sound Training Program

by D. B. WOODYATT
and A. W. JERREMS
United Air Lines

■ Kansas City, June 7

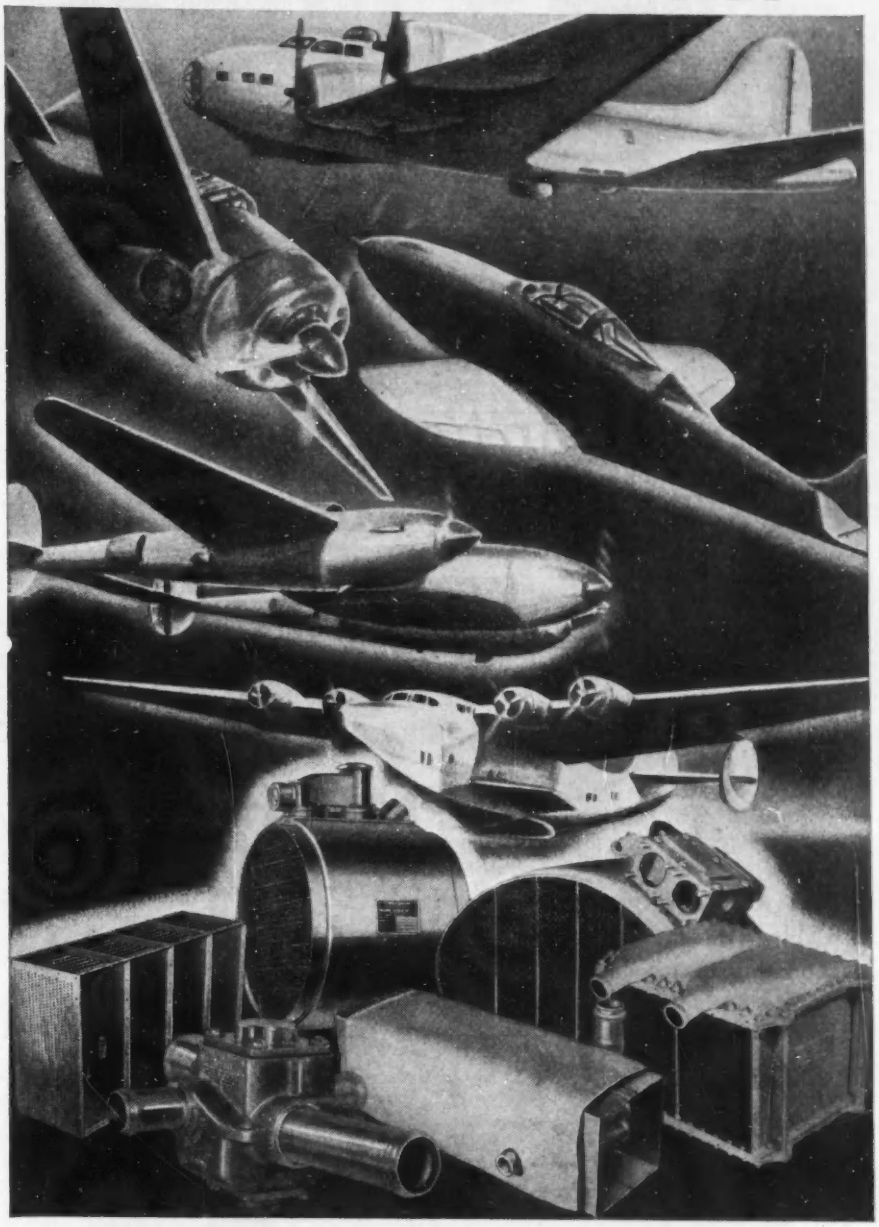
(Excerpts from paper entitled "An Analysis ...f the Fundamental Training Problems Cre...d within an Airline by a Transition from 2-Engine to 4-Engine Equipment")

THE acquisition of 4-engine airplanes by ...an airline which has been using 2-engine ...irplanes will bring about a multitude of ...w problems which must be met and solved ...y adequate training. Preparation for sound ...aining will require consideration of the ...llowing questions:

...1. What classifications of personnel will ...quire training? A partial list includes: ...lots, dispatchers, flight engineers, stew...ardesses, chief mechanics, crew chiefs, traffic ...ersonnel, reservations personnel, and all ...on-operating personnel. Everyone con...erned with the airline, from clerks on up...ard, should receive training.

...2. What types of training will be required ...r each of these classifications? The follow-

HEAT TRANSFER SPECIALISTS
TO THE AVIATION INDUSTRY



Changes come fast in the aviation industry. New ideas replace old, and make new problems in heat transfer. For more than a quarter century, Young engineers have worked with aircraft engineers, solving new problems as they came . . . developing oil coolers, coolant radiators, supercharger intercoolers, cabin heaters and temperature regulating systems. That's why Young stands ready now with the experience and manufacturing facilities to design and produce special or standard heat transfer units for every need.

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ing is an outline of a few procedures:

a. Introduction to 4-engine equipment, which covers advantages, appearance, performance and scheduling of the new airplane.

b. Operating familiarization and mechanical familiarization.

c. Because of greater quantities of cargo and new pit designs, new techniques in loading and unloading must be learned in order to minimize ground time and delays.

d. Passenger handling, sales training, overhaul and safety are other factors which require special training.

3. Where will the training be conducted? Of prime importance is consideration of any training facilities already existing. If there is now a training department functioning within the organization, the manner in which training is being handled by this department will have a strong bearing on where and how transition training will be carried out. In any case, some of the training will be done at fixed points, and some will be done locally at various airline stations.

4. Who will conduct the training? If a person is receiving on-the-job training, his supervisor is the one responsible for appointing an instructor, or else he does the teaching himself. If a person receives centralized training, in classrooms, shops, or other ... away from the job, he must be taught by ... qualified instructor.

5. Who will be responsible for ... planning and coordination of training? ... there is a training department, that ... group to hold this responsibility. How... each supervisor has his own responsibility ... the training program.

6. How will instructors be prepared? ... instruction training is a good start to ... persons to give sound on-the-job instruc... This can be arranged through the War Man... power Commission, which will either ... duct classes itself or train others to do ... Beyond that, there should be organized ... carefully planned training for instruc... covering such phases as determining train... needs, outlining programs, and develop... training materials.

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Brake Equalizing Insures Effective Vehicle Contro...

by TOM McDERMOT...

American Brake Shoe C...

■ Northwest, June ...

(Excerpts from paper entitled "Brake"...

THE degree of safety in the operation ... automotive vehicles is largely depende... upon the effectiveness of the brake con... available. Thus, the solution of effec... control for trucks, trailers, and buses oper... ing at present speeds lies in a brake sys... which is capable of developing sufficie... braking force and one which is flexible.

A number of years ago we became co... vinced that most of the chronic brak... troubles could be eliminated if the brak... were properly equalized and then subje... to a well planned and executed perio... maintenance program.

Lining Life Doubled

To prove this, we contacted an oper... who was constantly complaining of po... brake and drum lining life, unsatisfac... stopping ability and jack-knifing. We equ... ized the brakes—that is, we modified t... brakes so that all the brake shoes on t... vehicle were contacting the drum at t... same low pressure at the same time dur... the brake application. We also made s... that the retarding force developed by ea... wheel closely approached the designed r... tarding force. After this, brake complai... ceased, lining life doubled, and brake p... formance improved 50 to 75%.

One of the most important factors to co... sider in brake equalizing is the relation... of the brake chamber and brake shoe spri... to the brake chamber pressure required ... expand the brake shoes against the dru... In many installations the load strength ... these springs is excessive. Best braking r... sults will be obtained when the strength ... these springs is not in excess of the amo... necessary to insure performance of th... function when the friction of the vari... brake parts is held to a minimum. T... brake chamber return springs should ha... only enough strength to return the ca... cam shaft, slack adjuster, and so forth ... release position when all parts are in p... operating condition.

Mechanical considerations and pneuma... details are other factors concerned in br... equalizing. The primary mechanical c... sideration is the ratio of retarding force

weight, often referred to as the "K" factor. This is the most important factor determining the rate of deceleration.

A second mechanical factor to be considered is weight transfer. Braking forces tend to tip-end a vehicle and develop a moment of mass times acceleration times height of center of gravity of road, which acts to relieve rear wheel weight and increase front weight during deceleration.

Length of the slack adjuster which is used with the operating brake chamber must be considered if a reasonable period between service adjustments is to be obtained. The shoe return springs must also be designed to just keep the shoe in contact with the drum at all times. Data to date indicates that the minimum acceptable values for this spring force for normal extension of the spring is equivalent to twice the weight of both shoes with a maximum pickup of 50 lb per in.

Pneumatic details which must be considered are the maximum pressures required to force the brake shoes against the drums and the uniformity of these pressures.

roads, shipping facilities or highways similar to those we enjoy in this country. German submarines have also done an efficient piece of work in cutting this country off from outside sources of supply of coal, oil and varied strategic materials badly needed. I found that all locomotives were operating on wood, all private passenger cars had been laid up for lack of fuel, all motor trucks were operating on a curtailed schedule which had an accumulative effect of piling up freight at inland points intended for the cities or export.

One of the first surveys I made was in the City of Rio de Janeiro. There the motor bus industry was in a deplorable condition. Many spare parts such as axle shafts, oversize pistons, piston rings and beveled gears had disappeared entirely from the market, and those that could be found jumped in price from 500 to 600%.

In addition to this immediate market we have in Europe a potential outlet for other American-made goods. We need only apply ourselves to obtain low cost through mass production and transportation methods.

Brazil's Potentialities Challenge to United States

by J. F. WINCHESTER
Standard Oil Co. of N. J.

■ Cincinnati, May 22

(Excerpts from paper entitled "Air, Rail and Highway Transportation in the United States and Brazil")

RECENTLY the State Department sent me on a mission to make a survey of the railway and transportation facilities of Brazil – a country which infatuated me with its potential capacity for a great future. The result of this trip is that Brazil will receive for domestic purchase 8500 motor trucks and 1500 diesel fitted buses.

Throughout my entire course of travel I found the airports to be in first-class condition. However, if Brazil is to develop its natural and mineral resources in a short period of time, it will be necessary to adapt the airplane and glider to its needs. Here is a country that is larger than the United States, lacking in many of the modern facilities we have. It still makes use of man-power and man-propelled vehicles, still has cities unconnected by paved roads, and has only a small mileage of rail facilities as compared with this country.

Brazilians are now aware that if their vast amount of natural resources are to be developed, they will have to depend upon transportation. I believe Brazil is one of the greatest markets. Should we establish our-selves on a friendlier basis with Latin Americans than has been done in the past, there will be created an opportunity for American products to penetrate into remote areas of this continent. In turn, the citizens of these countries can supply us with outstanding materials at relatively low cost.

Brazil's highways, sanitation facilities, building structures, methods of administration, and so forth, are in many respects similar to those in the average American city. On the other hand, none of their great cities are linked together with modern rail-

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Crankcase Lubricant Formulation Described

by J. T. RONAN
Shell Oil Co.

■ No. California, Dec. 11

(Excerpts from paper entitled "Motor Oil Performance")

THE manufacture of motor oil begins with the selection of a crude oil. Geographic and economic considerations play important roles in this choice, since it is possible to prepare high quality lubricants from a majority of the crude oils available in this country. With few exceptions, present-day methods of manufacture involve three fundamental processing steps. Gasoline and other relatively low boiling constituents having volatility and viscosity characteristics beyond the lubricants range are first removed from the crude by simple distillation leaving a tar-like residue. Asphaltic-type materials are next eliminated by vacuum distillation or by treatment with solvents; and, finally, the product from the deasphaltizing operation, raw lubricating oil stock, is processed by solvent extraction methods to accomplish a further removal of undesirable constituents from the lubricant. Other distillation steps, acid treating, clay treating and manipulations to remove wax may be superimposed upon the three basic operations outlined above.

Raw lubricating oil stock fed to the solvent extraction process contains a very large number of hydrocarbons and hydrocarbon derivatives containing sulfur, nitrogen and oxygen which show only a very gradual change in physical and chemical properties throughout the spectrum of composition. It is extremely difficult to separate such a raw stock sharply into desirable and undesirable portions; hence, in practice, the degree to which solvent refinement is carried is determined by the nature of the lubricating crude, the solvent refining process used and the service for which the lubricant is intended.

It is generally observed that the tendency for motor oils to form sludge and lacquer in service decreases as the degree of solvent refinement is increased; however, severe refinement also results in the removal of natural oxidation inhibitors which may permit the formation of organic acids corrosive to alloy bearings. Obviously a balance must be reached between these conflicting factors, particularly when preparing non-compounded motor oils.

Sludge deposits which occur in service under conditions of low temperature operation and particularly under conditions which fluctuate between heavy-duty and low temperature operation constitute one of the most common and serious problems encountered in gasoline engine lubrication on the Pacific Coast. These deposits restrict the flow of lubricant to the various operating parts of the engine causing low oil pressure and occasional bearing failure. They also interfere with the efficient operation of the piston assembly causing high oil consumption and loss of power as a result of oil control ring plugging and sticking of compression rings.

Another problem frequently encountered is the formation of lacquer on the piston assembly and other parts of the engine under prolonged heavy duty conditions. Stuck compression rings are the usual result of a severe lacquering tendency and, under extreme conditions, engine freeze-up may occur.

The combustion process in internal-combustion engines contributes substantially to performance shortcomings often attributed to the lubricant. The influence of blowby combustion products and lubrication dilution, resulting from incomplete combustion, on engine cleanliness will be discussed in more detail subsequently.

The additives used in compounding crankcase lubricants fall into two general classifications, namely, oxidation inhibitors and detergents. Oxidation inhibitors lower the rate of oxidation of mineral oils in service, whereas detergents aid in preventing the deposition of oxidized or polymeric materials on engine parts. Detergents may not in themselves discourage the formation of oil insoluble products, but rather are characterized by their ability to peptize oil insolubles and to hold them in suspension. It is for this reason that detergent-type oils look dirty after a short period of service.

It follows that the use of additives in crankcase lubricants, particularly of oxidation inhibitors, permits greater latitude in depth of extraction or severity of refinement of the base mineral oil since compensation is made for the loss of natural inhibitors.

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LIGHT PEDAL PRESSURE *
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APPLICATIONS Received

The applications for membership received between July 10, 1945, and Aug. 10, 1945, are listed below. The members of the Society are urged to send any pertinent information with regard to those listed which the Council should have for consideration prior to their election. It is requested that such communications from members be sent promptly.

Buffalo Section: Melville Ehrlich.

Canadian Section: Albert L. Lord.

Chicago Section: George F. Bowers, David Harold Burbidge, George A. Ellis, Ray L. Howard, William C. Jackson, Lt.-Col. T. K. Lewis, Carroll V. Wells.

Cleveland Section: William E. Achor, James Francis Conners, William P. Murphy, Jean N. Vivien.

Dayton Section: Richard W. Shaw.

Detroit Section: Neff Theodore Dietrich, Sr., George Saunders Freeman, Lt. C. V. Gardiner, Fred J. Holmes, Burton L. Huesman, Hazen H. Kraus, Peter J. Miller, Arthur G. Reiser, Walther F. Scheel, Harry Westland, Edmund Witzke, Robert William Wright.

Hawaiian Section: James Lodl, Jr.

Kansas City Section: George Van Vlack Dickerson, John R. Griffin, Jr., H. A. Mayor, Sidney R. Wolf.

Metropolitan Section: Abner L. Mims, Jr., Harry C. Archer, Eldred W. Bemis, Selig J. Bernstein, Gordon D. Brown, Richard L. Charlesworth, C. Walter Frankenfield, William A. Furst, Peter P. Guarner, Eugene Halperin, Don McNeil, Richard W. Logan, Robert R. McCoy, Max Novak, Charles Henry Pettis, Henry W. Unguarth, William Russell, James M. Sherilla.

Mid-Continent Section: Harris James Elder, D. P. Thornton, Jr., Thell C. Woods.

Milwaukee Section: Richard D. Cory.

New England Section: Capt. Oswaldo N. Leal, Major Charles F. Peters.

Northern California Section: William I. Ballentine, Jr., Charles L. Butler, Thomas Martin Edwards, Samuel S. Thurston.

Northwest Section: Ed Short.

Philadelphia Section: William Dabney Bowman, Lt. J. G. William Hubbard Preston, Gordon F. Shandley, Frank A. Vossenberg, George A. Witsil.

Pittsburgh Section: Maurice J. Boegel.

St. Louis Section: B. R. McConnell, Sr.

Salt Lake City Group: Jerry Lester Gaer, Robert Kirsch, Clyde E. Ockey.

Southern California Section: Arnold N. Anderson, Albert C. Bauer, Robert J. Considine, Kenneth L. Fox, Albert C. Green, Gilbert Lamar Hitchcock, Elvis E. Jones, Lawrence C. Jones, Col. Frank C. Lynch, Michael J. Meier, Raymond H. Osbrink, Wilbur James Wells, Dan R. Rankin, Robert Thomas Rice, Clarence E. Stafford, J. Earl Tobey, Edmund Wilkes, III, Lynn J. Ziegelmeyer, Jack H. Zillman.

Southern New England Section: Burton Hathaway Albee, John Bayard Butler, John A. Dickie, John W. Mazur, Robert G. Melander, Harry John Pellerin.

Spokane Group: Lawson G. Black, August Stevens Matresse.

Syracuse Section: Frank E. Dellard.

Texas Section: Tommy J. Brewer, Claude D. Peebles.

Twin City Group: Senus Harms, A. P. Upton.

Washington Section: Carl Hinshaw, James A. Kline, Jr., Emmett L. Perkins, Jr., Lawrence E. Smithers, John G. Strand, Harry K. Woodward.

Wichita Section: Von LeRoy Morton.

Outside of Section Territory: E. C. Aldridge, Lt. (j.g.) Francis William Davidson, Howard Krook Pike, J. D. Sutton.

Foreign: Job Ronald Tremellen Bradford, England; James Victor Brown, England; Cecil Chilvers, England; George Vernon Cleare, England; Lewis Henry Dawtrey, England; Roy Erwin Foster, Australia; Victor Henry Frederick Hopkins, England; Pierre Prevost, France.

NEW MEMBERS Qualified

These applicants who have qualified for admission to the Society have been welcomed into membership between July 10, 1945, and Aug. 10, 1945.

The various grades of membership are indicated by: (M) Member; (A) Associate Member; (J) Junior; (Aff.) Affiliate Member; (SM) Service Member; (FM) Foreign Member.

Baltimore Section: William Hamilton Boyd (A), Harold Edward Roe (A).

Buffalo Section: Henry Heck Jones (M).

Canadian Section: Stanley Allen (A), Alfred H. Glionna (A), Leonard A. Richardson (A), Kenneth F. Tupper (M).

Chicago Section: Lt.-Col. W. J. Corr (SM), C. D. Davis (A), Alexander Dreisin (M), Harold D. Ellis (A), William H. Fowler (J), Arthur A. Friestedt (M), John J. Goodwillie (A), Nelson J. Gothard (M), John L. Lowe (M), E. L. Newman (A), Mark C. Nicholson (J), A. J. Peterson (A), Thomas A. Russell (M), Thomas J. Thompson (J), Morton E. Weldy (M).

Cincinnati Section: Harry C. Larick (J), Matthew Lawman, Jr. (J), William Leslie Steinwachs (J).

Cleveland Section: L. K. Acheson (M), John F. Amos (J), Irwin A. Binder (M), Richard Etnier Brown (A), Guy F. Chalfont (A), Howard N. Clark (A), Anthony Colnar (J), Warren Lee Gilmore (J), Samuel D. Gunning (M), Wilson Roy Heller (J), Benard E. Rodin (M), Harold Shames (J), Robert B. Wick (A).

Dayton Section: James Glen Blackwood (SM), Major Arnold D. Dircken (SM), Capt. Walter H. Niles (SM), Wm. Grant Pontis (M), Maurice W. Shayeson (J), Reber C. Stupp (M), Alfred C. Whiskin (M).

Detroit Section: Edward C. Bahn (A), Glen A. Bassett (A), Townsend F. Beaman (M), Bert G. Burnside (M), Paul J. Connell (J), Charles S. Davidson (M), Charles S. Davis, Jr. (A), Jerome J. Febr (M), Harold F. Harness (A), Walter H. Hedley (M), Capt. Donald B. Hooser (SM), E. C. Jeter (M), Edwin Gerner Kaunitz (M), Joseph S. Laird (M), James S. Lanham (M), Henry A. Lotz (M), Major Herman E. Minneman (SM), Charles E. Nadeau (A), Arthur E. Proctor, Jr. (M), Frederick Cruger Pyne (M), M. D. Rand (A), Russell W. Rieck (J), Earl F. Riopelle (J), Edward D. Scott (M), James E. Spittle (M), C. L. Stevens (M), Ray F. Thornton (M), August Toelle (M), Paul William Walaskay (J), Henry S. Walker (M), Wm. P. Wood (M).

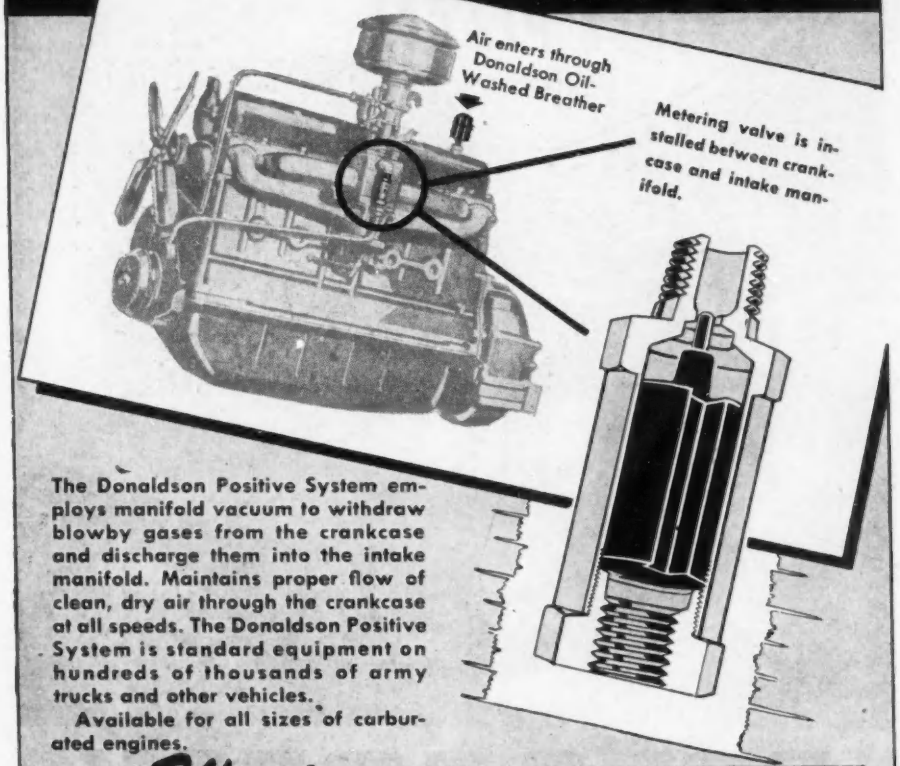
Hawaiian Section: John G. Brittain (A), Antone Souza Cavaco (A), Leo DeSaussure (SM), Leo D. Lavering (A), Malcolm H. Love (A), Raymond C. Marques (A), William Silva Mello (A), James R. Roller (A), H. Brian Stanley (M).

Indiana Section: Thane E. Houser (A), William F. Shirley (J).

Kansas City Section: Edward S. McCarthy (J), Harvey W. Morrow (A).

Metropolitan Section: Harrison E. Bopp (J), Sanford Karon (J), Ensign J. Packard Laird (J), Gunnar B. G. Larsson (FM), Howard E. Nehms (J), Harry L.

a POSITIVE system FOR POST-WAR CRANKCASE VENTILATION



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1. Functions at all engine speeds.
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3. Prevents oil contamination.
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Mid-Continent Section: Sid. N. Daily (A), Oscar O. Funderburg (A), Alan D. Morton (A), Will D. Parker (M).

Milwaukee Section: William O. Creutzburg (M).

New England Section: Lt. (jg) Wayne Harold Brown (J), Frank E. Davidson (M), Edward J. Fischel (A), Anthony Gambardella (M), Lewis W. Kerr (A), Sidney S. Von Loesecke (A).

Northern California Section: Joseph De Tilla (A), Geo. F. Gayer (M), Harold Raymond Knott (A), Martin D. Knox (A), Ralph H. Langner (A), Roy E. Mayo (M), George H. Reading (A).

Northwest Section: Edwin L. Griffin (A), Ensign Fred George Heiderer (J), Philip George Hills (A), Keith K. McDaniel (A), Alfred P. Nelsen (A), Raymond Elroy Peterson (A), Asa LeRoi Pierson (A), R. A. Sanguinetti (A), Kenneth A. Short (A).

Oregon Section: Floyd D. Chapman (A), C. A. Dillinger (A), M. W. Ekman (A).

Philadelphia Section: Robert W. Donahue (J), Otto A. L. Keser (A), E. Robert Kinnebrew (A), Frederic C. Meldola (M), Leonard A. Stewart (M), Harry Tabachnick (J).

Pittsburgh Section: Gerald S. Adelman (J), William J. Cappe (A), Equitable Auto Co. (Aff.), Reps: Warren J. Iliff, J. R. Lancaster, Peter C. Weinkauf. Carl F. Harms (A), Otto Walter (A).

St. Louis Section: Howard W. Benjamin (M), William P. Harrison (J), Robert J. Semple (M).

Salt Lake Group: Jay Percy Bywater (A), Virgil E. Lyman (A).

Southern California Section: John G. Bachr (A), W. Kenneth Belisle (J), Donald L. Boody (A), Donald J. Carr (A), Gordon C. Christy (J), Robert Wells Corder (A), John F. Crane (J), Richard F. Englert (J), John Elwood Frazer (M), Major Edwin Hall Graham (S M), Ralph T. Greer (A), Edgar A. Griswold (M), Otis C. Johnson (J), Harry Everett Karst (M), C. B. Livers (M), Nathan Newby, Jr. (A), B. E. Rogers (M), Richard U. Seares (M), D. L. Story (M), Reagan C. Stunkel (M), Dave Swedlow (M), Josiah T. Watts (M), Frank P. West (A), Paul E. Williams (A), Richard de Wart Williams (J), William C. Wold (J), John B. Work (A), A. B. Wyrick (M).

Southern New England Section: Edward H. Granville (M), Loyd E. Neil (A), Albert E. Schwartz (A), Coleman S. Williams (M).

Spokane Group: Alfred T. Le Mieux (A), Henry W. Wick (A).

Syracuse Section: Howard L. Hoke (M).

Texas Section: Bret E. Evans (A), Clifton Herschell Havins (J), Harold K. Lockaday (A), Capt. Gerald E. Hynan (J), Lt. P. Jones (A).

Twin City Group: Stephen Crum (M), John Edward Ralls (A), Wayne E. Schober (M), Hubert T. Sparrow (M), D. G. Taylor (M).

Washington Section: Lt. Com. Frederick R. Bolton (A), William H. DeLaVergne (M), Joseph C. Diliberto (J), George S. Garrard (M), Major George Walker Gilmer, III (S M), Lee Webster Selfe (A).

Western Michigan Section: William G. E. Forsberg (M), Gerrit Steenhagen (M).

Wichita Section: Dean E. Burleigh (M), Lt. H. Delmar Chitwood (J).

Outside of Section Territory: Thomas C. Banks (A), John William Barker (M), Ceicel D. Brown (A), William Douglas Laird (J), John Macready (A), Lt. Ernest Alexander Magyar (J), John L. Sheetz (A), George M. Miller (S M).

Foreign: Francis Grimsdick Clarkson (F M), (England); George Alexander Heslip (F M), (England); George Herbert Lanchester (F M), (England); James Arnold Latham (F M), (England); John William Leach (A), (South America); William Lewis Morgan (F M), (England).

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The series of P-20 Peer Welders were developed to provide manufacturers of sheet metal and wire products with automatically air operated machines capable of high speed precision projection and general spot welding. They are sturdily constructed, low priced, direct air operated, press type machines.

Shown above, is a Peer P-20 set up with safety guard which is so adjusted that, when lowered, it trips the switch and causes the welder to pass through a complete welding cycle before the machine automatically lifts the guard and stops, ready for the next operation. Other means such as a footswitch control, can also be used to actuate the welding cycle.

The standard cylinders furnished with these welders provide nominal electrode force up to a maximum of 1000 lbs. Pressures are easily adjusted by the air pressure regulating valve. The welders may be operated with strokes suitable for work at hand within the range of from 0" to 3".

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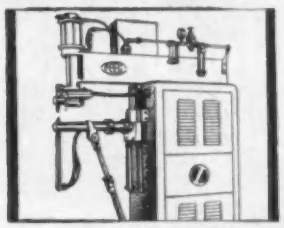


Air Operated Press Type Spot Welder

Remember this wrapper

Z-82

About SAE MEMBERS

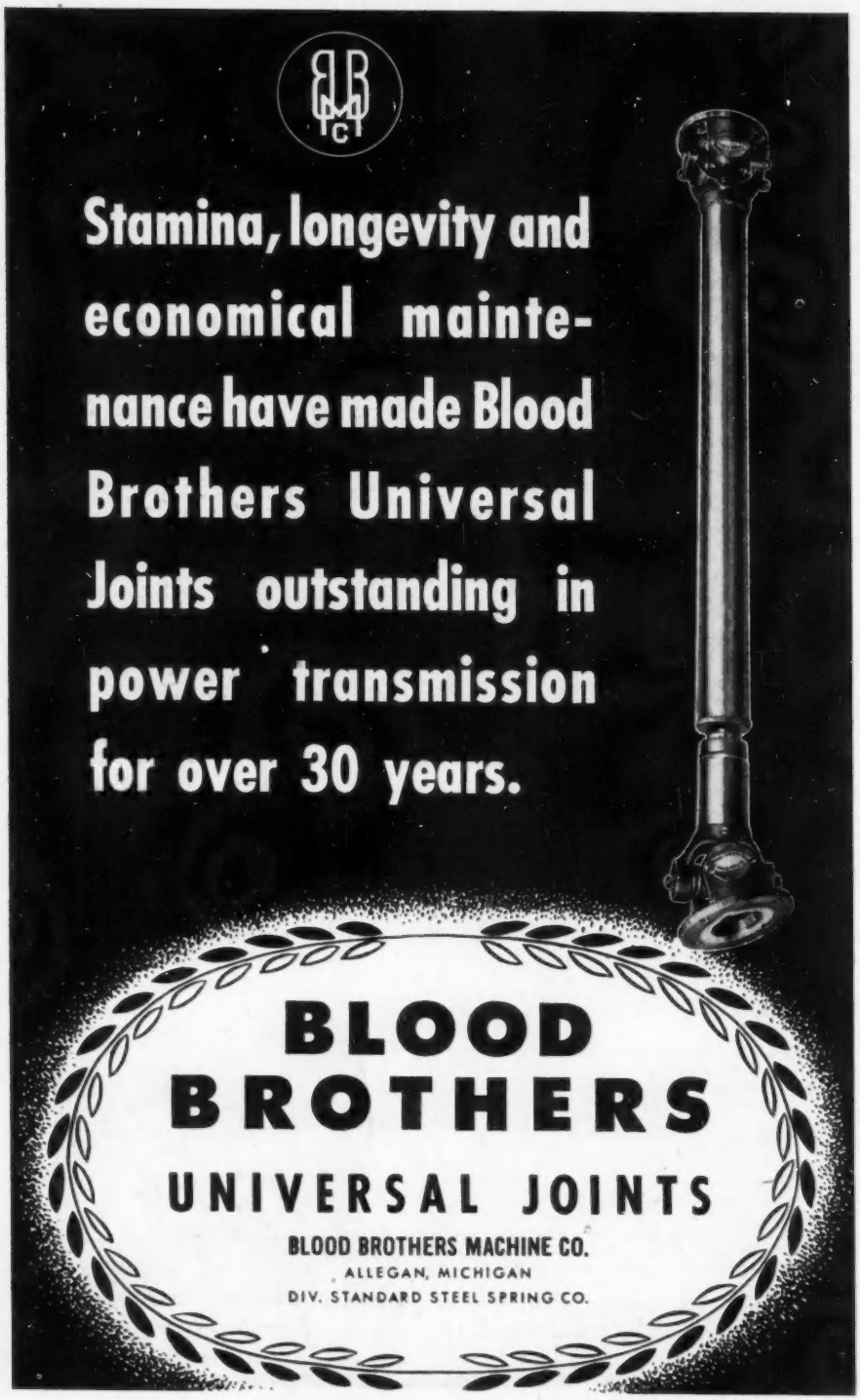
cont. from p. 32

WILLIAM R. CUBBINS, JR., who had been director, field operations, Flight Training Research Association, Inc., Washington, D. C., is now representative in the National Account Department of Mack-International Motor Truck Corp., New York City.

LESLIE H. BREWER, formerly aircraft engineer, Bechtel-McCone Corp., Aircraft Division, Birmingham, Ala., is now mechanical engineer with the Higgins Engine Co., Inc., New Orleans, La.

Formerly assistant professor, mechanical engineering, Fenn College, Cleveland, Ohio, **GEORGE V. PARMELEE** is now a research fellow, Research Laboratory, American Society of Heating and Ventilating Engineers, Cleveland.

Formerly engineering draftsman A, Lockheed Aircraft Corp., Burbank, Calif., **GORDON C. LAWSON** is now an aviation radio technician trainee in the U. S. Navy and is stationed at the Naval Air Technical Training Center, Ward Island, Corpus Christi, Tex.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ALLEGAN, MICHIGAN
DIV. STANDARD STEEL SPRING CO.

Formerly a student member at the University of Minnesota, Minneapolis, Minn., **CARL SELMER, JR.,** is now an apprentice seaman in the USNR and is attending the Midshipmen's School at Notre Dame, Ind.

ARNOLD B. MEDBERY, who had been training adviser, Pratt & Whitney Aircraft Division, United Aircraft Corp., East Hartford, Conn., is now a seaman first class in the USNR.

Previously development engineer, Helicopter Division, Bell Aircraft Corp., Buffalo, N. Y., **CHAUNCEY J. HAMLIN, JR.,** is now associated with the Rheem Mfg. Co., Henderson, Nev., where he holds the position of facilities engineer.

ROBERT W. GAINES, who had been project engineer, General Motors Proving Ground, Milford, Mich., is now mechanical designer, Systems Research Laboratory, Harvard University, Cambridge, Mass.

Formerly air engineer, ground crew, Royal Air Force Transport Command, Dorval, Montreal, Que., Canada, **S. W. IRVINE** has been temporarily assigned to the British Overseas Airway Corp., B.O.A.C., Municipal Airport, Baltimore, Md.

ANDRE DaMIANO, who had been civilian automotive adviser, U. S. Army, 5th Service Command, Fort Hayes, Ohio, is now employed by Promenade Publications, New York City

NORBERT E. PENTZ, technical corporal in the Corps of Engineers, U. S. Army, has been transferred from Yuma, Ariz., to Camp San Luis Obispo, Calif.

JOHN VOTYKA has been appointed chief engineer of Motor State Products Co., Ypsilanti, Mich. Mr. Votypka, SAE past vice-president representing the Passenger Car Body Activity, was formerly chief engineer of Fruehauf Trailer Co., Detroit. In his new position, Mr. Votypka will be in charge of engineering on the pushbutton convertible top.

GEORGE V. ALEVIZON, USMC, has been promoted to the rank of lieutenant and has been transferred from Quantico, Va., to Camp Lejeune, N. C.

RAY D. McMULLIN, who had previously been executive engineer, Kiekhaefer Corp., Cedarburg, Wis., is now industrial division engineer with McCulloch Aviation, Milwaukee, Wis.

Formerly factory manager, Brad Ford Gear Works, Inc., Ciecero, Ill., **EMIL T. JOHNSON** is now general manager, Lawrenz Engineering Co., Chicago, Ill. The Lawrenz firm is a newly organized company of consulting engineers specializing in tooling, production, and so forth.

JULIUS E. PRIFOGLE is now process engineer with the Perfect Circle Co., Richmond, Ind. He was previously factory manager of the Perfect Circle Co., Ltd., Toronto, Canada.

HOWARD F. KIRK, JR., a lieutenant (jg) in the USNR, is now powerplants engineer at the Naval Air Station at Patuxent River, Md. He was formerly engine maintenance officer at the same station.

C. M. EDMONDS is now a staff assistant at the Applied Physics Laboratory of Johns Hopkins University, Baltimore, Md. Mr. Edmonds was formerly connected with Research Associates, Manitou Springs, Colo.

Formerly at the University of Minnesota, Naval Training Unit, Minneapolis, Minn., **EDWIN C. SCHAFER** is now an apprentice seaman and is stationed at the USNR Midshipmen's School at Notre Dame, Ind.

WILLIAM K. WILEMON, U. S. Army, has been promoted from lieutenant colonel to colonel, and is currently serving as director of supply, Third Service Command, Baltimore, Md.

S. R. DICKEY has been elected president of Materiel, Inc., Ephrata, Wash. Mr. Dickey was formerly superintendent of maintenace, Puget Sound bus operation, Washington Coach Co., Seattle, Wash.

Formerly in the maintenace division, Lambert Field, St. Louis, Mo., **HERBERT R. FORD,** seaman first class in the USNR, has been transferred and may now be contacted c/o Fleet Post Office, San Francisco, Calif.

RICHARD L. SMIRL, who had formerly been project engineer on transmission development, product study group, General Motors Corp., Detroit, is now assistant chief engineer, Borg & Beck Division, Borg-Warner Corp., Chicago, Ill.

JOHN V. MOYNES, formerly a student member at the University of Detroit, is now in the U. S. Army. Before entering the Army, he was an engineering representative with the Falk Corp., Detroit.

Formerly assistant officer in charge of maintenance and repair, Fort Pierce, Fla., **LT. W. R. LACEFIELD, USNR,** is now repair officer and may be reached c/o Fleet Post Office, New York City.

Formerly structural design engineer, Curtiss-Wright Corp., Research Laboratory, Buffalo, N. Y., **STEPHEN A. TIRONE** is now tool engineer with Fedders Mfg. Co., same city.

W. B. SWANK is now sales manager with the E. F. Johnson Co., Waseca, Minn. He formerly served in the same capacity with Swank-Liddle, Inc., Detroit.

Formerly assistant to the chief development engineer, Vickers-Armstrong, Ltd., Chertsey, Surrey, England, **JOHN B. PERRETT** has been appointed chief designer, Messrs. A.F.N., Ltd., Falcon Works, Isleworth, Middlesex, England.

Formerly at Frankfort Arsenal, Philadelphia, Pa., **PFC. JAMES M. PORTER,** U. S. Army, is now with the Ordnance School Battalion, Aberdeen Proving Ground, Md.

LT. JAMES H. HENRY, USNR, has been transferred from the Naval Training School at Richmond, Va., to the Naval Training School (Diesel), Cleveland, where he is training officer.

Formerly powerplant engineer, Fisher Body Division, General Motors Corp., Aircraft Development Section, Detroit, **ROBERT F. KOHR** is now research engineer with Ford Motor Co., Dearborn, Mich.

Previously assistant chief draftsman, **JAMES POSAVAC** has been promoted to the position of product engineer, Weatherhead Co., Cleveland.

LT. R. E. CARLSON, USNR, has been transferred from the Rensselaer Polytechnic Institute, Troy, N. Y., to the Naval Ordnance Laboratory, Navy Yard, Washington, D. C.

ALEC E. ULMANN has resigned his position as president of Hub Industries, Inc., of Long Island City, N. Y., in order to resume his former activities as export consultant and export manager for various American aviation interests. Mr. Ulmann was affiliated with the Hub organization for the last four years.

Formerly chief engineer in the Diesel Engine Division, American Locomotive Co., Schenectady, N. Y., **J. W. ANDERSON** is now affiliated with the Atlas Imperial Diesel Engine Co., Oakland, Calif.

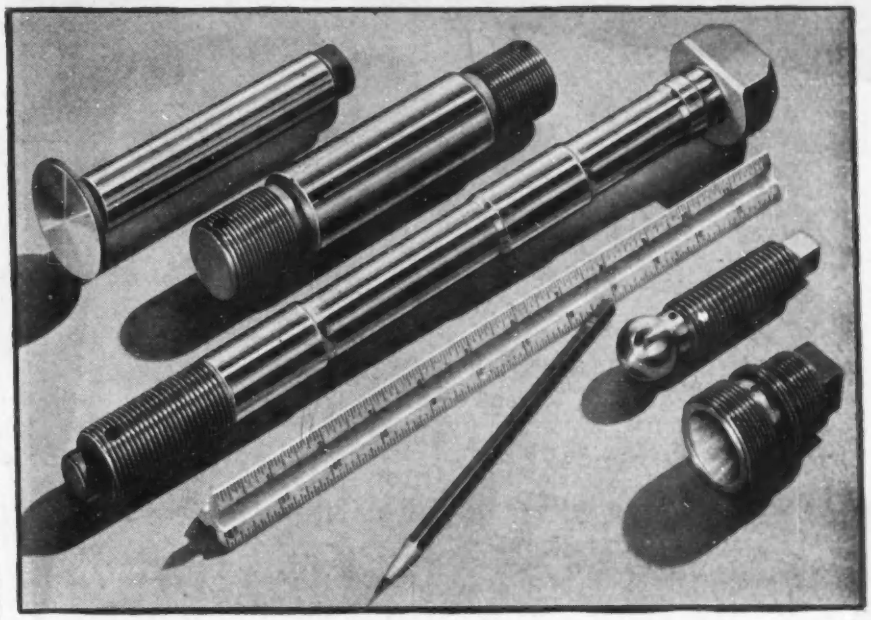
ELMORE J. SANDERS has recently become connected with the Evans Products Co., Toledo, Ohio. He was formerly chief engineer with the Sam C. Earley Co., Toledo Kontrol-Fan Division, same city.

ROBERT N. DOBBINS, formerly a lieutenant, USNR, Auxiliary Air Station, Quillayute, Wash., has been promoted to the rank of lieutenant commander and may be reached c/o Fleet Air West Coast, San Diego, Calif., where he will be serving aboard an aircraft carrier.

HOWARD F. DOLL is now chief engineer with Victor Electric Products, Inc., Cincinnati, Ohio. He was formerly assistant works manager and plant superintendent of National Mineral Co., Chicago.

Formerly an engineer, U. S. Army, Ordnance Department, Office, Chief of Ord-

BIG STUFF



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nance-Detroit, **J. R. COSTELLO** is now affiliated with the Stover Lock Nut & Machinery Corp., Easton, Pa.

HALSEY W. HURON, who had been senior inspector, Boeing Aircraft Co., Seattle, Wash., may now be reached at the U. S. Naval Air Station at Alameda, Calif., where he is a member of the Aircraft Reconditioning Board.

Formerly project engineer, research laboratory, Borg-Warner Corp., Detroit, **PAUL E. GERY** is now associated with Aluminum Alloys Corp., same city.

STEPHEN FERENCE, who had been field service representative with Curtiss-Wright Corp., Propeller Division, Caldwell, N. J., is now with the Chrysler Pittsburgh Co., Inc., Pittsburgh, Pa., where he is director of service.

EDWARD S. PARDOE, who had been in charge of the bus and electric railway section, Transport Equipment Branch, War Production Board, Washington, is now president and treasurer of Transit Bus Sales, Inc., same city.

MELVIN A. WILSON, who had been resident engineer for military products, in the Detroit branch of the Goodyear Tire & Rubber Co., is now development engineer in the Akron, Ohio, branch of the same company.

Formerly technical officer, Ministry of Aircraft Production, London, England, **J. J. A. O'HARA** has left England to return to New Zealand to take an appointment with De Haviland Aircraft of New Zealand, Ltd.

Previously head automotive adviser, U. S. Army, Fort Ord, Calif., **REX TAYLOR** has recently been appointed general manager of Cords Piston Ring Mfg. Co., San Diego, Calif.

JAMES H. BOATNER is now field engineer with the Clayton Mfg. Co., Alhambra, Calif. Mr. Boatner was previously an instructor in the U. S. Navy.

WENDELL S. SMITH has recently joined Casco Products Corp., Bridgeport, Conn., as sales engineer. Mr. Smith was formerly field engineer for Gates Rubber Co., Denver, Colo.

L. M. HORVATH has recently become connected with General Controls Co., Hi-G Division, Glendale, Calif., as divisional sales manager.

J. N. JOHNSON, regional director, Associated Transport, Inc., has transferred his headquarters from Baltimore, Md., to Burlington, N. C.

Formerly production engineer and group leader, Consolidated Vultee Aircraft Corp., San Diego, Calif., **LaVERNE E. MORGAN** has been transferred to the Nashville, Tenn., branch of the same company and is now design engineer "A."

FRANK H. VIVIAN, who had been sales engineer, Four Wheel Drive Auto Co., Clintonville, Wis., is now assistant to the president of the same company.

SAE members who have had recent changes in company status include: **CARL A. BRAMAN,** Consolidated Vultee Aircraft Corp., San Diego, Calif., from liaison engineer to assistant general engineer; **ROBERT B. MACGREGOR,** Wilcox-Rich Division, Eaton Mfg. Co., Detroit, from designer to design engineer; and **CHARLES H. SWEENEY,** Wright Aeronautical Corp., Paterson, N. J., from junior test engineer to field engineer at the Glenn L. Martin Co.

SAE members in the armed forces who have received recent promotions include: **WALTER H. NILES,** U. S. Army, Dayton, Ohio, from captain to major; and **ROLLIN D. RICHTER,** U. S. Army, Headquarters, Western Pacific, from 1st lieutenant to captain.

Formerly a student member at the University of Minnesota, Minneapolis, Minn., **RICHARD M. JACK** is now an ensign in the USNR and is stationed at Fort Pierce, Fla.

Formerly placement officer, Pennsylvania Institute for Instruction of Blind, Philadelphia, **O. E. DAY** is now chief of the Division State Council for the Blind, Department of Welfare, Commonwealth of Pennsylvania.

Formerly a student member at General Motors Institute, Flint, Mich., **F. N. BERNARD** is now a private in the U. S. Marine Corps. Before entering the service, Pvt. Bernard was connected with General Motors Corp., Detroit.

A. L. STICA, who had formerly been president of the Garfield Mfg. Co., Detroit, is now working for himself as an engineer with offices in Picayune, Miss.

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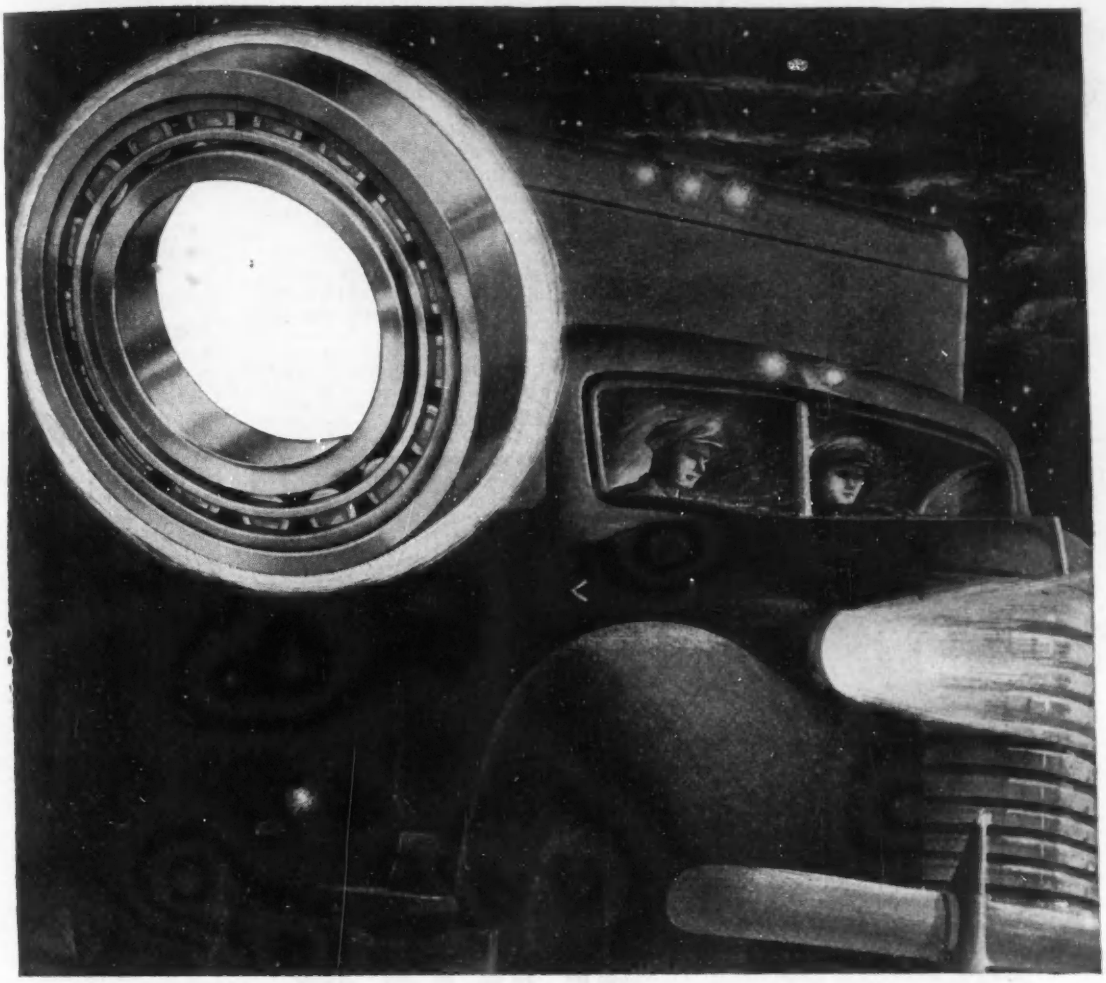

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Previously connected with the Service Castor & Truck Division, Domestic Industries, Inc., Albion, Mich., **ROBERT MALCOLM** is now design engineer, Chevrolet Light Car Division, General Motors Corp., Detroit.

RICHARD COULSON has retired from the position of chief sales engineer to the Renold & Coventry Co., Ltd., Manchester, England. He will, however, continue to be interested in the application of roller chain to front-end drives, of which he has been the foremost exponent in Europe.

PAUL HEFTLER has retired from the engineering field. His former position was powerplant engineer, Boeing Aircraft Co., Plant No. 2, Seattle, Wash.

GEORGE C. CARHART is now a consulting engineer at San Gabriel, Calif., where he is specializing in gears and transmissions. He had been division engineer, Detroit Diesel Engine Division, General Motors Corp., Detroit.

Formerly general manager, Lake Shore Lines, Inc., Renton, Wash., **HARLEY W. DRAKE** has resigned from this capacity and is now living in Seattle.

WENDELL J. SANDERS may be reached at the C. I. T. Galcit Jet Propulsion Laboratory, Pasadena, Calif., where he is senior designer.

A former student at the University of California, **WINFIELD E. DIXON** is now in the U. S. Navy, attending Midshipmen's School, Section No. 12, Notre Dame, Ind.

RONALD A. GATENBY, who had been laboratory technician, Cadillac Motor Car Co., Detroit, is now in the U. S. Army, stationed at Fort Riley, Kans.

ORVIN E. FLINT, formerly a student at Purdue University, is now in the U. S. Navy, attending the Midshipmen's School, Columbia University, New York City.

HAROLD A. MENGERT is now head of the drafting section of the Experimental Engineering Division of Bendix Aviation Corp., Detroit, Mich. Mr. Mengert was formerly executive engineer, Stout Research Division, Consolidated Vultee Aircraft Corp., Dearborn, Mich.

Formerly a student at the University of Minnesota, Minneapolis, **D. E. COLLINSON** is now in the USNR and is attending Midshipmen's School at Notre Dame, Ind.

C. C. WEBB, formerly with the research group, Mechanical Development Laboratory, E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., is now with the machinery development group in the engineering department of the same company.

FRANCIS C. CHANDLER, U. S. Quartermaster Corps, has been promoted to the rank of lieutenant colonel. Colonel Chandler, who has been serving overseas for 2½ years, is now commanding officer of a Quartermaster battalion.

M. A. TRISLER, formerly carburetor engineer, Allison Division, General Motors Corp., Indianapolis, Ind., has been transferred to GM Product Study, Australian Operations, Detroit.

WILBUR R. VESTER, U. S. Army, has been promoted to the rank of second lieutenant. Lieutenant Vester is in the Paratrooper Regiment at Fort Benning, Ga.

BEN H. GERKER is now a manufacturers' agent with private offices in St. Louis, Mo. Mr. Gerker previously held the position of production engineer, with Carter Carburetor Corp., same city.

WILLIAM W. COLLINS, who had formerly been mechanical design engineer with Glenn L. Martin Co., Baltimore, Md., is now a mechanical engineer with E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

WALTER M. DAVIES is now wing design engineer with the Globe Aircraft Corp. of Fort Worth, Tex. He was formerly senior engineer with Curtiss-Wright Corp., Columbus, Ohio.

Formerly at the Detroit Diesel Division of General Motors Corp., **OSCAR SOKOL, JR.** has been transferred to the Saginaw Steering Gear Division of the same company where he is employed as designer.

ELMER C. SLAUGHTER is now assistant chief engineer in the electromechanical division of Lear, Inc., Grand Rapids, Mich. Mr. Slaughter was formerly chief design engineer of the Piqua, Ohio, branch of the company.

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